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DISEASES OF WOMEN

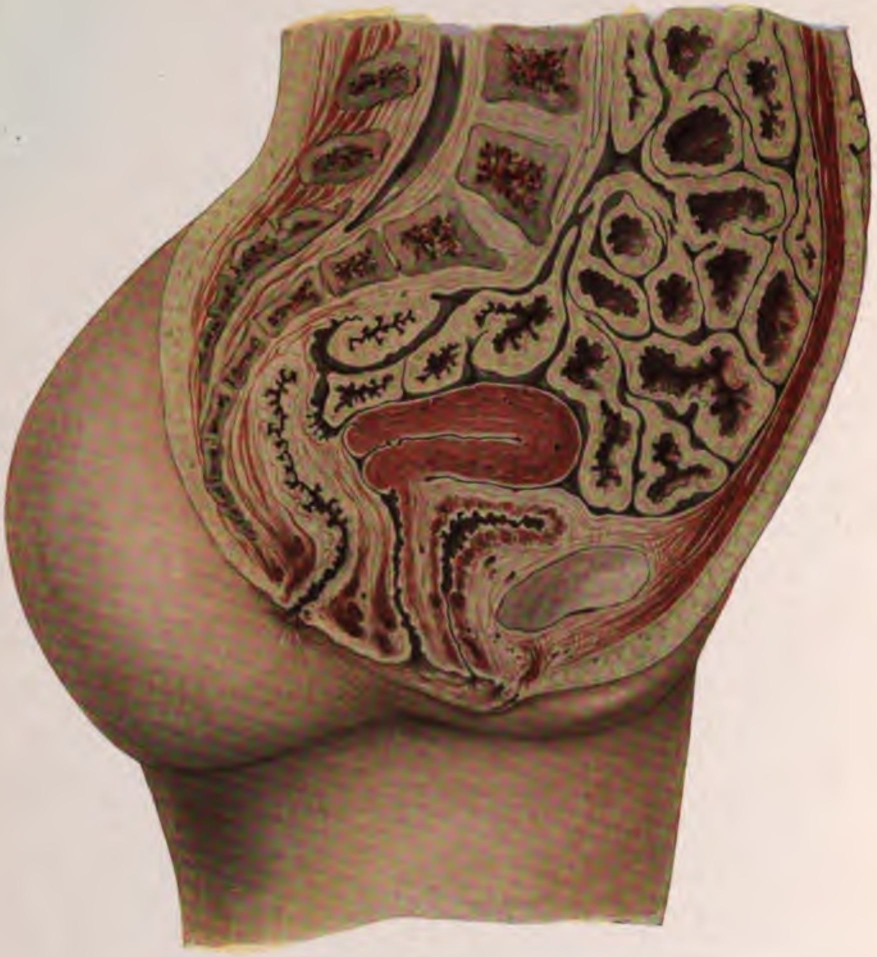

Fig. 1.—Anteroposterior Section of Pelvis (semi-diagrammatic).

In order to show the structures and relations exactly as they are in what may be considered a typical woman in the erect posture, a detailed study was made of many drawings from frozen sections for the internal relations, and of several well-formed women in the normal standing posture for the contour and external relations. This gave a result differing considerably from the usual representation of a patient standing, made by taking a drawing of a section of a flattened cadaver and turning it upright. The lumbar curve is more marked, the lower abdominal wall and the buttocks are more prominent and there is a change of the relations of the internal organs to the external landmarks.

For the internal relations the admirable frozen sections of Sellheim were principally followed, and the exactness with which the pelvis and contents of the actual sections fitted into the contours of the living models was most pleasing and instructive. (Redrawn and colored from original drawing by Dr. R. Walter Mills.)

DISEASES OF WOMEN

BY

HARRY STURGEON CROSSEN, M.D., F.A.C.S.

CLINICAL PROFESSOR OF GYNECOLOGY, WASHINGTON UNIVERSITY MEDICAL SCHOOL, AND GYNECOLOGIST IN CHIEF TO THE BARNES HOSPITAL AND THE WASHINGTON UNIVERSITY DISPENSARY; GYNECOLOGIST TO ST. LUKE'S HOSPITAL; CONSULTING GYNECOLOGIST TO THE JEWISH HOSPITAL, ST. JOHN'S HOSPITAL AND THE ST. LOUIS MATERNITY HOSPITAL; FELLOW OF THE AMERICAN GYNECOLOGICAL SOCIETY AND OF THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS, AND ABDOMINAL SURGEONS.

FIFTH EDITION, REVISED AND ENLARGED

WITH NINE HUNDRED THIRTY-FOUR ENGRAVINGS,
INCLUDING ONE COLOR PLATE

ST. LOUIS
C. V. MOSBY COMPANY
1922

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TO THE MEMORY OF

DR. HENRY HODGEN MUDD

THIS WORK IS RESPECTFULLY

DEDICATED

AS A SLIGHT TOKEN OF APPRECIATION

OF

HIS SPLENDID PROFESSIONAL ATTAINMENTS,

HIS UNSELFISH DEVOTION TO THE CAUSE OF MEDICAL EDUCATION

AND HIS INSPIRING PERSONAL FRIENDSHIP

PREFACE TO FIFTH EDITION

The entire resetting necessary for this new edition has given opportunity for the extensive revision which the author has for some time desired. Earnest effort has been made to bring all subjects up to date. The important advances in x-ray and radium therapy, in their relation to malignant disease and uterine myoma and other pelvic conditions, together with the helpful developments in pelvic x-ray diagnosis, have been considered at length. Pathology has been emphasized both in text and illustrations. The distinctions between physiological and pathological changes in the endometrium, the exact pathology of subinvolution of the uterus, the nature and distribution of adenomyomata, the rôle of ovarian "endometrial" cysts in pelvic pathology,—all these are live subjects in the study of which there have been signal advances.

In illustrating gynecologic microscopic anatomy and pathology, actual photomicrographs have been largely adhered to. This insures a complete view of the tissue and condition, without the omissions and the overemphasis of certain elements which are almost inevitable with drawings. The various elements of these complex structures (for example the endometrium or the myometrium or the ovarian tissue) change considerably in estimated relative importance with additional study and changing theories. A tissue element considered merely incidental today becomes of decided functional value tomorrow. Hence the importance of presenting at all times as complete a tissue-picture as possible, even at the expense of some clearness in detail. The photomicrographs are from material in the Gynecologic Laboratory of the Washington University Medical School. They were collected through careful selection and painstaking work over a period of several years by Dr. Otto H. Schwarz, formerly Chief of the Laboratory and now Associate Professor of Obstetrics. Study of the illustrations will show the excellence of this work. The additions to the text concerning the pathology of the various gynecologic conditions are by Dr. R. E. Wobus, at present Chief of the Gynecologic Laboratory. The advances in endocrinology as it relates to gynecologic affections have been noted by Dr. Hugo Ehrenfest, who wrote the chapter on this subject in the preceding edition. The chapters on preoperative preparation and postoperative care have been brought up to date by Dr. F. P. McNalley, my assistant in private work during the past year. The new drawings are largely by Mr. Ivan F. Summers. The photomicrographs were made by Mr. Wm. Holzmark and Mr. A. M. Obrecht.

The difficulty of adequately presenting the complex subject of Gynecology, with its rapidly expanding accumulation of important clinical and pathological data, within the limits of a single volume, is appreciated by the Publishers and they have been liberal accordingly in the allowance of space.

H. S. Crossen.

85247

PREFACE TO FIRST EDITION

This work is devoted exclusively to the DIAGNOSIS and TREATMENT of Diseases of Women as those diseases are met with in the office and at the bedside by the general practitioner. No space is given to other considerations, except as necessary to bring the work to its highest usefulness as a practical guide in the lines indicated. While no space is taken up with detailed technical descriptions of major operations, much care is taken to set forth clearly the differential diagnosis of the various conditions requiring such operative treatment, the kind of operation called for by the particular conditions present, what the operation is intended to accomplish, the preparation of the patient for operation and the after-care necessary to complete the restoration to health.

In my experience as a consultant and as a teacher I find that the two principal stumbling-blocks encountered in the way of accurate gynecologic work are, first, the difficulty of determining exactly the conditions present in the pelvis, and, second, the lack of a clear understanding of the indications governing the selection of the particular treatment best adapted to each of the various classes of cases under each disease. Special consideration is given to these important phases of the subject.

My endeavor throughout has been to present the important points CLEARLY and SYSTEMATICALLY—so clearly and so systematically that they will be readily understood and well retained in mind for use at the bedside. To this end much thought has been given to the ARRANGEMENT OF THE TEXT, so as to show not only the facts of a subject, but also the mutual relation of the facts and their bearing and relative importance in the diagnosis and treatment. The necessary facts are presented clearly and fully, and UNINCUMBERED by the vast and confusing mass of gynecological knowledge with which the specialist must deal.

To this end, likewise, the ILLUSTRATIONS have been most carefully selected, with the one idea of making clear the points under consideration. From the extensive field of gynecological literature I have endeavored to bring the BEST illustration available to elucidate each point. Those from reference works necessarily cover a wide range, and I wish here to express my hearty thanks to the authors and publishers of the works so used.

I have added over two hundred and twenty illustrations of my own. In these I have endeavored particularly to show the actual care and handling of the patients, thus bringing to those who have not had the opportunity of gynecologic hospital training many facts which can be satisfactorily presented in no other way. For this purpose I have had taken over five hundred photographs. Only a part of them, however, could be used in this work on account of limited space. Most of these photographs were taken by my clinical assistant, Dr. R. E. Wobus, to whose skill and patience I bear appreciative tribute.

My thanks are due to my colleague, Dr. Henry Schwarz, Professor of Obstetrics in Washington University, for helpful suggestions.

I wish to thank Dr. F. J. Taussig and Dr. H. A. Hanser, my Senior Clinical Assistants, for valuable help in various ways.

To Dr. R. W. Mills, the artist, I wish to express my appreciation. His painstaking care and fidelity in representation are apparent in all the drawings made by him.

For engravings of instruments I am indebted to Mr. C. W. Alban, instrument dealer, of this city.

The publishers have aided me throughout by their courtesy and cordial cooperation, for which I wish to express my sincere thanks.

H. S. CROSSEN.

PREFACE TO SECOND EDITION

The character of this work is indicated in the extract from the preface to the first edition. My endeavor has been to present clearly and in detail the foundation facts and principles of Gynecology—the anatomic, pathologic, diagnostic and therapeutic information underlying successful gynecologic work.

Two hundred pages of text and fifty original illustrations have been added. The index, upon which the practical usefulness of a medical book so largely depends, has been greatly amplified, so as to include references and cross-references to every diagnostic and therapeutic item. In the new text special attention has been given to the presentation of pelvic inflammation and of tubal pregnancy—two live and important subjects, upon each of which an enormous and chaotic mass of information has accumulated. To properly emphasize the established landmarks and point out important features of advance work—such was the task. Disturbances of function merit, and have received, careful and detailed consideration, both from the diagnostic and therapeutic standpoint. Medico-legal complications are claiming more and more attention each year, and those connected with gynecology are considered in a detailed and practical way.

My thanks are due to Mr. Thos. Jones, the artist, for the careful work shown in the new drawings.

I would appear remiss in gratitude did I not express my appreciation of the gratifying reception accorded the first edition by teachers and practitioners.

H. S. CROSSEN.

PREFACE TO THIRD EDITION

The scope of this work is fully set forth in the previous editions. The method of presentation has proved so satisfactory that no change is indicated. Serologic diagnosis and treatment, as applicable in gynecologic work, has received consideration. The treatment of inoperable cases of severe uterine prolapse and cystocele, has been given special attention and a number of new drawings have been made to elucidate the action of the most effective pessaries for this condition. New facts have been added under a number of other topics. The new illustrations are by Mr. Ivan F. Summers, whose patience and skill I much appreciate.

H. S. Crossen.

PREFACE TO FOURTH EDITION

The two principal additions in this revision are, first, numerous drawings and photomicrographs illustrating gynecologic pathology; and, second, a chapter on the ductless glands in their relation to gynecology. The drawings and photomicrographs were made from material in the Gynecologic Laboratory of the Washington University Medical School, and in their preparation invaluable assistance was rendered by Dr. Otto H. Schwarz, in charge of the Laboratory. The helpful chapter on the ductless gland system was written at my request by Dr. Hugo Ehrenfest, to whom I am indebted also for his great kindness in seeing the book through the press, my doing so being prevented by an early call to war duty. The drawings are by Mr. Ivan F. Summers and present his usual satisfying excellence.

H. S. Crossen.

PUBLISHER'S NOTE, FOURTH EDITION

Having barely started on a thorough revision of this volume for its fourth edition, Dr. Crossen, as a member of the Medical Officers Reserve Corps, was called to active war duty early in 1917, and he is now serving with his regiment on the western front in France.

Many new illustrations, most carefully selected and prepared by him in the course of the last few years, and notes in regard to the many changes contemplated were turned over to Dr. Hugo Ehrenfest, Professor of Obstetrics and Gynecology, St. Louis University, who willingly had accepted Dr. Crossen's request to finish the preparation of the manuscript for the new edition.

We gratefully acknowledge Dr. Ehrenfest's valuable and, indeed, enthusiastic aid in accomplishing this difficult task within a very limited time.

CONTENTS

CHAPTER I

GYNECOLOGIC EXAMINATION METHODS

History, 1; Physical Examination, 11; Abdominal Examination, 12; Localization of Backache, 31; Examination of External Genitals and Adjacent Structures, 31; Vaginal Examination (Digital), 37; Vaginoabdominal Examination (Bimanual), 50; Instrumental Examination, 73; Rectoabdominal Palpation, 88; X-ray Examinations, 91; Examination of Other Organs, 108; Pelvic Examination under Anesthesia, 112; Preparations for Gynecologic Examination, 120.

CHAPTER II

GYNECOLOGIC DIAGNOSIS

Method of Diagnosis, 132; Prominence of the Abdomen, 133; Movement of Abdominal Wall, 143; Discoloration of Abdominal Surface, 144; Tension of Abdomen, 144; Tenderness in Abdomen, 145; Mass Felt on Abdominal Palpation, 150; Area of Dullness in Abdomen, 152; Points in the Examination of External Genitals (Discharge, Ulcer, Inflammation, Swelling), 157; Points in the Vaginal Examination (Tenderness, Mass, Cervix Changes), 167; Points in Vaginoabdominal Examination (Corpus Uteri Changes, Mass Felt in Pelvis or Lower Abdomen), 172; Points in the Differential Diagnosis of Various Masses in the Pelvis, 173; Points in the Speculum Examination, 189; Pain in Pelvis or Lower Abdomen, 190; Backache, 195; Reflected Pains, 198; Disturbances of Function, 198.

CHAPTER III

GYNECOLOGIC TREATMENT

Rest, 200; Applications to the Lower Abdomen and Exterior of Pelvis, 202; Applications to External Genitals, Vagina and Cervix, 206; Intrauterine Treatment, 218; Applications to the Lower Abdomen and Interior of Pelvis, 224; Applications to Body Generally, 227; Postural Methods and Exercise, 229; Internal Treatment, 233; Radium, 235; X-ray, 236; Operations, 238.

CHAPTER IV

DISEASES OF THE EXTERNAL GENITALS AND VAGINA

Points in Anatomy, 239; Classification of Diseases, 251; Gonorrhea 251; Simple Vulvitis, 268; Follicular Vulvitis, 271; Erysipelas of Vulva, 272; Cellulitis of Vulva, 273; Gangrenous Vulvitis, 274; Diphtheritic Vulvitis, 274; Eczema of Vulva, 274; Intertrigo, 276; Herpes of Vulva, 277; Prurigo of Vulva, 278; Parasitic Diseases of Vulva, 278; Simple Vaginitis, 279; Trichomonas Vaginitis, 282; Aphthous Vaginitis, 285; Diphtheritic Vaginitis, 286; Emphysematous Vaginitis, 286; Adhesive Vaginitis, 286; Exfoliative Vaginitis, 289; Simple Ulcers, 289; Chancroid, 291; Syphilis, 297; Tuberculosis of Vulva, 304; Tuberculosis of Vagina, 306; Granuloma Inguinale, 307; Malignant Disease of the Vulva, 310; Malignant Disease of the Vagina, 314; Ulcus Rodens Vulvae, 317; Urethritis, 318; Periurethral Abscess, 318; Prolapse of Urethral Mucosa, 320; Urethral Caruncle, 321; Inflammation of Vulvovaginal Gland, 322; Abscess of Vulvovaginal Gland, 322; Sinus of Vulvovaginal Gland, 325; Cyst of Vulvovaginal Gland, 326; Condylomata of the Vulva, 328; Stasis Hypertrophy of Vulva, 332; Nonmalignant Tumors of Vulva, 337; Nonmalignant Tumors of Vagina, 338; Cysts of Vulva, 339; Cysts of Vagina, 340; Pudendal Hernia, 342; Pudendal Hydrocele, 345; Hematoma of Vulva, 346; Varicose Veins of Vulva, 348; Injuries of External Genitals, 348; Kraurosis Vulvae, 350; Pruritus Vulvae, 354; Hyperesthesia of the Vaginal Entrance, 357; Adhesions of Prepuce, 358; Adhesions of Labia, 359.

CHAPTER V

RELAXATION AND FISTULAE

Points in Anatomy, 360; Relaxation of the Pelvic Floor, 365; Colpocele, Rectocele, Cystocele, 392; Rectovaginal Fistula, 395; Vesicovaginal Fistula, 399.

CHAPTER VI

INFLAMMATORY AND NUTRITIVE DISEASES OF THE UTERUS

Points in Anatomy, 409; Menstrual Changes, 416; Pathologic Changes, 428; Classification of Diseases, 430; Localization of Diseases, 430; Acute Endocervicitis, 432; Chronic Endocervicitis, 434; Erosion of Cervix, 438; Ulcer of Cervix, 441; Laceration of Cervix Uteri, 443; Hypertrophy of Cervix, 460; Cervical Polypi, 463; Hyperplasia of Endometrium, 434; Acute Endometritis, 469; Chronic Endometritis, 472; Curettage of Uterus, 477; Subinvolution of Uterus, 481; Hypertrophy of Myometrium, 486; Chronic Metritis, 488; Hyperinvolution of Uterus, 490; Tuberculosis of the Uterus, 491; Syphilis of the Uterus, 494; Echinococcus Disease of Uterus, 496.

CHAPTER VII

DISPLACEMENT OF THE UTERUS

Points in Anatomy, 499; Backward Displacement of the Uterus, 501; Prolapse of the Uterus, 535; Other Displacements of Uterus, 550.

CHAPTER VIII

NON-MALIGNANT TUMORS OF UTERUS

Myoma of the Uterus, 553; Symptoms and Signs, 574; Pregnancy and Myoma, 597; Lipoma of the Uterus, 599.

CHAPTER IX

MALIGNANT DISEASE OF THE UTERUS

Carcinoma of the Cervix Uteri, 600; Carcinoma of the Corpus Uteri, 632; Sarcoma of the Uterus, 639.

CHAPTER X

PELVIC INFLAMMATION

Points in Anatomy, 644; Fallopian Tubes, 644; Pelvic Peritoneum, 649; Pelvic Connective Tissue, 650; Acute Pelvic Inflammation, 651; Chronic Pelvic Inflammation, 676; Differential Diagnosis of Chronic Pelvic Inflammation, 690.

CHAPTER XI

OTHER AFF NS

Pelvic Tuberculosis, 7 Other Pelvic Disorders, 741;
Hemorrhage, 741; Fa Fallopian Tubes, 744;
Torsion of Adnexa. Echinococcus Disease
of Pelvis, 746;

CHAPTER XII

TUMORS OF THE OVARY AND PAROVARIUM

Points in Anatomy and Physiology, 747; The Ovary, 747; The Parovarium, 761; Classification, 762; Cystic Tumors of the Ovary, 763; Solid Tumors of the Ovary, 801; Tumors of the Parovarium, 807.

CHAPTER XIII

MALFORMATIONS

Points in Development, 812; Anomalies of Development, 815; Imperforate Hymen, 817; Atresia of Vagina, 818; Double Vagina, 819; Malformations of the Uterus, 820; Pseudohermaphroditism, 823.

CHAPTER XIV

DISTURBANCES OF FUNCTION

Points in Physiology (Normal Menstruation), 827; Absence of Menstruation (Amenorrhea), 831; Scanty Menstruation, 843; Excessive Menstruation (Menorrhagia), 843; Painful Menstruation (Dysmenorrhea), 846; Intermenstrual Pain, 864; Irregular Menstruation, 865; Precocious Menstruation, 865; Vicarious Menstruation, 865; Dyspareunia, 866; Sexual Impotence, 869; Sterility, 869; Leucorrhea, 875; Bloody Discharge, 879.

CHAPTER XV

THE INTERNAL SECRETORY GLANDS IN RELATION TO GYNECOLOGY

Historical Facts, 892; Definition of Internal Secretion, 883; Chemical Nature of Internal Secretions, 884; Interglandular Relation, 885; Influence of Individual Endocrine Organs on the Genital Apparatus, 887; Gynecologic Anomalies Due to Disturbed Endocrine Gland Function, 896; Therapy, 903.

CHAPTER XVI

OTHER ORGANS IN RELATION TO GYNECOLOGY

Digestive System, 911; Respiratory System, 912; Circulatory System, 912; Urinary System, 913; Muscular System and Bones and Joints, 914; Skin, 914; Acute Infectious Diseases, 914; Organs of Special Sense, 915; Nervous System, 915.

CHAPTER XVII

INVASION OF THE PERITONEAL CAVITY

Abdominal Section, 921; Indications, 922; Contraindications, 922; Dangers, 923; Preparations, 923; Regular Steps, 934; Special Points, 936; Vaginal Section, 938; Advantages, 938; Disadvantages, 939; Selection of Cases, 939; Preparations, 940; Steps, 940; Conservative Surgery, 940.

CHAPTER XVIII

AFTER-TREATMENT IN OPERATIVE CASES

After-treatment in Abdominal Section, 944; After-treatment in Vaginal Operations, 958.

CHAPTER XIX

MEDICO-LEGAL POINTS IN GYNECOLOGY

Rape, 961; Foreign Bodies Left in Abdomen, 971; Other Conditions, 971.

ILLUSTRATIONS

CHAPTER I

RELATIONS OF THE PELVIC ORGANS

FIG. PAGE
1. Anteroposterior section of pelvis (Color Plate) . . . . Frontispiece
2. Contour and measurements of two models 2
3. Anteroposterior section, with intestines out 3
4. Posterior view of pelvic organs 4
5. Anterior view of pelvic organs 4
6. Relation of pelvic organs to external surface 5

GYNECOLOGIC EXAMINATION METHODS

The History

7. Indicating general pelvic distress 6
8. Indicating lumbar backache 6
9. Indicating sacral backache 6
10. Pain in right kidney region, laterally 7
11. Pain in right kidney region, posteriorly 7
12. Gynecologic history card, face 9
13. Gynecologic history card, reverse 9

Abdominal Examination

14. Patient arranged for abdominal examination 12
15. Profile of normal abdomen 13
16. Contour of abdomen in moderate ascites 13
17. Contour of abdomen in marked ascites 13
18. Contour of abdomen in cystic tumor 14
19. Contour of abdomen in solid tumor 14
20. Abdominal surface with landmarks, slender individual 15
21. Abdominal surface with landmarks, stout individual 16
22. Palpation of the abdomen, first step 17
23. Palpation of the abdomen, second step 17
24. Palpation with both hands 17
25. Deep palpation with both hands 17
26. Abdominal surface divided into quadrants 18
27. Usual anatomic division of abdominal surface 19
28. Division of abdominal surface with circle 19
29. Regions, by division with circle 20
30. Various areas of significant point-tenderness 21
31. Point for kidney tenderness, laterally 22
32. Points for kidney tenderness and sacroiliac-joint tenderness 22
33. Relation of kidney to last rib 22
34. Displacing mass upward to see if pelvic attachment 22
35. Showing direction of growth of various abdominal tumors 23
36. Testing thickness of abdominal wall, first step 24
37. Testing thickness of abdominal wall, second step 24
38. Method of palpating for movable kidney, first step 24
39. Method of palpating for movable kidney, second step 24
40. Testing for fluid wave in abdomen 26
41. Differentiating fat wave from fluid wave 26

FIG. PAGE
42. Ordinary percussion 27
43. Deep percussion 27
44. Indicating area of dullness from bladder 27
45. Indicating area of dullness from moderate ascites 27
46. Indicating area of dullness from pregnancy 28
47. Indicating area of dullness from marked ascites 28
48. Sectional view, tumor, patient on back 28
49. Sectional view, ascites, patient on back 28
50. Sectional view, tumor, patient tipped to side 28
51. Sectional view, ascites, patient tipped to side 28
52. Lines for measuring the size of the abdomen 30

Examination of External Genitals

53. Patient arranged for examination of external genitals and adjacent structures . 31
54. Normal external genitals 32
55. Normal external genitals, multipara 32
56. Pressing pus from urethra 34
57. Appearance of pus about urethral opening 34
58. Drop of pus pressed from Skene's gland 34
59. Vulvovaginal gland 34
60. Appearance of pus about vulvovaginal gland 35
61. Palpating vulvovaginal gland 35

Vaginal Examination (Digital Examination)

62. Position of fingers for vaginal examination 38
63. Hand gloved, ready for examination 38
64. Position of thumb and outside fingers 39
65. Bony arch above vaginal opening 39
66. Testing the pelvic floor with the examining fingers 43
67. Testing the pelvic floor with the examining fingers 43
68. Testing pelvic floor with one finger 44
69. Testing pelvic floor with both index fingers 44
70. Method of everting anal tissues 45
71. Showing possible evrsion in some cases 45
72. Relation of cervix to examining finger 46
73. Relation of cervix to examining finger 46
74. Anteflexion of cervix, corpus in normal position 47
75. Anteflexion of cervix, inflammatory mass behind 47
76. Anteflexion of cervix, with retroversion of uterus 47
77. Simple notch of cervix, profile 48
78. Simple notch of cervix, front view 48
79. Deep unilateral tear of cervix, front view 48
80. Deep unilateral tear of cervix, side view 48
81. Deep bilateral tear with eversion, profile 48
82. Deep bilateral tear with eversion, front view 48
83. Everted cervix before rolling lips together 48
84. Everted cervix after rolling lips together 48
85. Softening of cervix 49
86. Hard nodule in cervix 49

Vaginoabdominal Examination (Bimanual Examination)

87. Bimanual examination, outside fingers folded in palm 50
88. Bimanual examination, outside fingers extended in gluteal crease 50
89. Palpating body of uterus 51

FIG. PAGE
90. Uterus displaced by partly filled bladder 51
91. Uterus displaced by partly filed bladder 51
91. Depressing abdominal wall too close to pubes 52
92. Depressing abdominal wall too close to pubes. Sectional view 52
93. Pushing cervix backward and upward 52
94. Palpating corpus, size and shape—small tumor 52
95. Palpating corpus, consistency—fluid in uterus 52
96. Degrees of retrodisplacement 54
97. Retroversion 55
98. Retroversion 55
99. Retroflexion 55
100. Pulling down uterus to bring it within reach 55
101. Palpating size and shape of corpus uteri 56
102. Palpating size and shape of corpus uteri 56
103. Nodules in corpus uteri 56
104. Nodules in corpus uteri 56
105. Palpation of corpus uteri. The conditions in early pregnancy 57
106. The area of compressibility 57
107. Palpating with corpus forward 57
108. Palpating with corpus somewhat back 57
109. Palpating relation of tumor to corpus uteri 58
110. Palpating small myoma, sessile 58
111. Palpating large myoma, sessile 58
112. Palpating pediculated myoma 58
113. Palpating normal adnexa 59
114. Palpating adnexal mass 59
115. Palpating adnexal diffuse infiltration 59
116. Invagination of the perineum, force transmitted to elbow through the knee 60
117. Invagination of the perineum, force transmitted to elbow through the knee 60
118. Invagination of the perineum, force transmitted to elbow through iliac crest 61
119. Palpation of the left adnexal region 62
120. Palpation of the left adnexal region 62
121. Palpation of the left adnexal region 62
122. Palpating right adnexal region 64
123. Palpating right adnexal region, tube and ovary between fingers 64
124. Determining attachment of mass to posterior surface of uterus 66
125. Palpating the ureter 66
126. Showing location of the large nerve roots to be palpated 67

Instrumental Examination

127. Instruments for the regular speculum examination 74
128. Gaylor's scissors for clipping specimen from cervix 74
129. Suction bulb and tube for removing abundant mucus 74
130. Bivalve speculum in place and opened 75
131. Introducing bivalve speculum, first step 76
132. Introducing bivalve speculum, second step 76
133. Introducing bivalve speculum, third step 76
134. Normal virgin cervix 78
135. Normal virgin cervix 78
136. Normal parous cervix 78
137. Senile cervix 78
138. Endocervicitis, with free flow of mucus 78
139. Discharge, with laceration and erosion 78

FIG. PAGE
140. Erosion, with scattered cysts 78
141. Types of Sims' speculum; Graves' speculum changed to Sim's type 80
142. Patient in Sims' posture 81
143. View from above, showing Sims' posture 81
144. Method of introducing Sims' speculum 82
145. Method of holding Sims' speculum 82
146. Cervix uteri brought into view 83
147. Instruments for exploration of interior of uterus 85
148. Rectoabdominal palpation 88
149. Palpating the pedicle of a tumor 88
150. Rectovaginoabdominal palpation 90
151. Palpation of coccyx 90

X-Ray Examinations

152. Apparatus for insufflating gas through fallopian tubes 92
153. Another apparatus for insufflating gas through tubes 92
154. Pulsating gas meter 93
155. Needle and uterine cannula, for pneumoperitoneum 94
156. Apparatus for pelvic pneumoperitoneum, with gas pressure valve 94
157. Position of patient and apparatus in uterine gas insufflation 95
158. Diagrammatic representation of position of patient for pelvic pneumoperitoneum . 101
159. Table arrangement for holding patient in position 102
160. Patient in position on table 102
161. Pneumoperitoneum x ray plate, normal pelvis 104
162. Pneumoperitoneum x-ray plate, early pregnancy 105
163. Pneumoperitoneum x-ray plate, tuboovarian mass 106
164. Pneumoperitoneum x-ray plate, adhesions in posterior part of pelvis 107

Pelvic Examination Under Anesthesia

165. Curettings. Hyperplasia of endometrium 116
166. Curettings. Hyperplasia showing cystic change 116
167. Curettings. Endometritis 116
168. Curettings. Endometritis, higher power 116
169. Curettings. Adenocarcinoma of endometrium 117
170. Curettings. Adenocarcinoma, high power 117
171. Curettings. Sarcoma of endometrium 118
172. Curettings. Tuberculosis of endometrium 118
173. Curettings. Recent abortion, showing chorionic villi 118
174. Curettings. Recent abortion, showing decidual cells 118
175. Exploration of interior of uterus with finger 119

PREPARATIONS FOR GYNECOLOGIC EXAMINATION

176. Simple instrument boiler 123
177. Small instrument and dressing sterilizer 123
178. Articles needed for preparing for gynecologic examination 124
179. Patient arranged in bed for abdominal examination 127
180. Patient arranged in bed for vaginal examination 128
181. Position of examiner for accurate bimanual examination with patient in bed . . 128
182. Regular cross-bed position 129
183. Partial cross-bed position 129
184. Kitchen table arranged with clamps and foot-rests for special gynecologic examination in home 130
185. Kitchen table arranged with clamps and uprights for minor gynecologic operation in home 130

CHAPTER II

GYNECOLOGIC DIAGNOSIS

FIG. PAGE
186. Obesity, patient on back 134
187. Obesity, patient standing 134
188. Obesity resembling pregnancy or a tumor 134
189. Tumor of abdominal wall 135
190. Umbilical hernia with relaxed wall 135
191. Relaxed wall, contour with patient recumbent 136
192. Relaxed wall, contour with patient standing 136
193. Diastases of recti muscles, diagrammatic 137
194. Diastases of recti muscles, patient 137
195. Diastases of recti muscles, patient 137
196. Tympanites, resembling pregnancy or tumor 138
197. Contour in moderate ascites 139
198. Contour in marked ascites 139
199. Contour in pregnancy 140
200. Distended bladder, with early pregnancy and retrodisplacement 141
201. Distended bladder in labor 141
202. Contour in cystic tumor 141
203. Contour in solid tumor 142
204. Contour in retroperitoneal tumor 142
205. Areas of special interest in right lower abdomen 146
206. Indicating point for appendix tenderness 146
207. Indicating point for adnexal tenderness 146
208. Palpating for appendix 147
209. Indicating point for ureteral tenderness 147
210. Indicating point for kidney tenderness in front 147
211. Indicating point for kidney tenderness laterally 148
212. Indicating point for kidney tenderness in back 148
213. Indicating point for gall bladder tenderness 149
214. Indicating region of dullness from enlarged liver 153
215. Indicating region of dullness from enlarged spleen 153
216. Indicating area of dullness from ascites, patient on back 153
217. Indicating area of dullness from ascites, patient standing 153
218. Indicating area for adnexal abscess 154
219. Indicating area for appendiceal abscess 154
220. Area of dullness in retroperitoneal tumor 156
221. Indicating area of dullness in kidney tumor before inflation of colon 156
222. Indicating area of dullness in kidney tumor after inflation of colon 156
223. Showing the supposed cause of reflex pains in the various regions 197

CHAPTER III

GYNECOLOGIC THERAPEUTIC MEASURES

224. Arrangement for vaginal douche 207
225. Vaginal tampons 215
226. Schultze tampon 216
227. Tampon-capsules 217
228. Applicators for intrauterine treatment 221
229. Knee-chest posture 230
230. Incorrect knee-chest posture 230
231. Incorrect knee-chest posture 230
232. Special exercise to strengthen abdominal wall 232
233. External genitals, virgin 240
234. External genitals, diagrammatic 240

CHAPTER IV

ANATOMY OF EXTERNAL GENITALS

FIG. PAGE
235. External genitals, married woman 241
236. External genitals, after childbirth 241
237. Periurethral ducts (Skene's glands) 242
238. Periurethral ducts, urethra sectioned longitudinally 242
239. Periurethral ducts, urethra sectioned transversely 242
240. Periurethral ducts, probe in each duct 242
241. Periurethral ducts, in hardened specimen 243
242. Periurethral ducts, microscopic section 243
243. Vulvovaginal glands (Bartholin's glands) anatomical location 245
244. Vulvovaginal glands, microscopic low power 245
245. Vulvovaginal glands, microscopic high power 246
246. Veins of the external genitals 247
247. Nerves of the external genitals 247
248. Vagina, longitudinal section 248
249. Perineum, section showing shape 248
250. Vagina, cross section 248
251. Vaginal wall, microscopic 250

DISEASES OF EXTERNAL GENITALS

252. Gonococci in stained specimen 256
253. Gonococci, diagrammatic 256
254. Follicular vulvitis 271
255. Pediculus pubis 278
256. Trichomonas vaginalis 283
257. Thrush fungus 285
258. Adhesive vaginitis, single lesion 287
259. Adhesive vaginitis, appearance in vagina 287
260. Adhesive vaginitis, adhesions 287
261. Adhesive vaginitis, adhesions, speculum examination 287
262 Chancrodial ulcers 292
263. Syphilitic lesion of external genitals, flat condylomata 300
264. Syphilitic lesion of external genitals, flat condylomata 300
265. Syphilitic lesion of external genitals, pointed condylomata 300
266. Syphilitic ulceration with stais hypertrophy 302
267. Syphilitic ulceration with stasis hypertrophy 302
268. Syphilitic ulceration, microscopic 302
269. Syphilitic ulceration, microscopic 302
270. Syphilitic lesion, microscopic 303
271. Tuberculosis of external genitals 305
272. Tuberculosis of external genitals 305
273. Tuberculosis of vagina 306
274. Tuberculosis of vagina, microscopic 306
275. Granuloma inguinale, groin lesion 307
276. Granuloma inguinale, vulvar lesion 307
277. Granuloma inguinale, vulvular lesion 308
278. Granuloma inguinale, inguinal glands 308
279. Granuloma inguinale, microscopic 308
280. Granuloma inguinale, microscopic 308
281. Granuloma inguinale, vulvar lesion 309
282. Granuloma inguinale, effect of treatment 309
283. Carcinoma of exterior genitals, early 311

FIG. PAGE
284. Carcinoma of exterior genitals, early 311
285. Carcinoma of clitoris 311
286 Carcinoma starting from condyloma 311
287. Carcinoma starting from condyloma, microscopic 312
288. Carcinoma starting from condyloma, microscopic, high power 312
289. Carcinoma starting from kraurosis 312
290. Carcinoma starting from kraurosis 312
291. Carcinoma starting from kraurosis, microscopic 313
292. Carcinoma starting from kraurosis, microscopic, high power 313
293. Sarcoma of external genitals 313
294. Carcinoma of vagina, secondary 315
295. Carcinoma of vagina, primary 315
296. Sarcoma of vagina in child 316
297. Sarcoma of vagina in child, microscopic 316
298. Sarcoma of vagina in child, microscopic, high power 316
299. Suburethral abscess, diagrammatic 319
300. Suburethral abscess, case 319
301. Eversion of urethral mucosa 320
302. Prolapse of urethral mucosa 320
303. Urethral caruncle 320
304. Urethral caruncle, microscopic 321
305. Abscess of vulvovaginal gland 323
306. Abscess of vulvovaginal gland 323
307. Abscess of vulvovaginal gland, double 323
308. Abscess of vulvovaginal gland, microscopic 324
309. Abscess of vulvovaginal gland, microscopic 324
310. Cyst of vulvovaginal gland 326
311. Cyst of vulvovaginal gland 326
312. Cyst of vulvovaginal gland, microscopic 326
313. Tuberculosis of vulvovaginal gland 327
314. Tuberculosis of vulvovaginal gland, microscopic 327
315. Carcinoma of vulvovaginal gland 327
316. Carcinoma of vulvovaginal gland, microscopic 327
317. Carcinoma of vulvovaginal gland 328
318. Condylomata acuminata of vulva 329
319. Condylomata acuminata of vulva 329
320. Condylomata acuminata of vulva, microscopic, low power 330
321. Condylomata acuminata of vulva, microscopic, high power 330
322. Condylomata acuminata of vulva, microscopic, higher power 330
323. Stasis hypertrophy of vulva 332
324. Stasis hypertrophy of vulva 332
325. Stasis hypertrophy of vulva 332
326. Stasis hypertrophy of vulva, showing ulceration 333
327. Stasis hypertrophy of vulva, microscopic 333
328. Elephantiasis of vulva 334
329. Hypertrophy of labia minora, moderate 334
330. Hypertrophy of labia minora, Hottentot apron 335
331. Hypertrophy of clitoris 338
332. Fibroma of external genitals 338
333. Labial cyst, large 339
334. Labial cyst, large 339
335. Small labial cysts 339
336. Cyst of clitoris 339

FIG. PAGE
337. Vaginal cyst from Gaertner's duct 341
338. Dermoid cyst of vaginal wall 341
339. Group of small cysts of vaginal wall 341
340. Small cyst of vaginal wall 341
341. Inguinolabial hernia 342
342. Inguinolabial hernia, diagrammatic 342
343. Vaginolabial hernia 343
344. Vaginolabial hernia, diagrammatic 343
345. Vaginolabial hernia, in perineum 344
346. Vaginolabial hernia, sectional view 344
347. Vaginolabial hernia, intraabdominal view 344
348. Hematoma of external genitals 347
349. Varicose veins of external genitals 347
350. Injury of external genitals 349
351. Injury of external genitals 349
352. Injury of external genitals 349
353. Kraurosis vulvae 349
354. Kraurosis vulvae, microscopic, showing absence of elastic tissue 351
355. Normal structures, showing elastic tissue 351
356. Kraurosis vulvae with beginning carcinoma 352
357. Preputial adhesions 358
358. Preputial adhesions, separated 358
359. Labial adhesions 359
360. Labial adhesions, treated 359

CHAPTER V

ANATOMY OF PELVIC FLOOR

361. Pelvic floor, diagrammatic 360
362. Dissection, showing vessels of pelvic floor 361
363. Dissection, showing levator ani muscles 362
364. Dissection, showing rectovesical fascia 362
365. Pelvic sling, showing function 363
366. Pelvic sling, showing function 364
367. Pelvic sling, showing function 364

LACERATION OF PELVIC FLOOR

368. Recent lacerations in labor 366
369. Recent lacerations, diagrammatic 368
370. Old laceration of pelvic floor 368
371. Cystocele and rectocele, moderate 369
372. Cystocele and rectocele, diagrammatic 369
373. Diagnosis of rectocele 369
374. Rectocele, small 371
375. Rectocele, large 371
376. Diagnosis of cystocele 371
377. Cystocele, large 371
378. Laceration into rectum, recent, diagrammatic 372
379. Laceration into rectum, old, diagrammatic 372
380. Laceration into rectum, old 373
381. Laceration into rectum, old 373

REPAIR OF PELVIC FLOOR

382. Instruments for repair of pelvic floor 377
383. Supplementary instruments 377
384. Repair of floor, making incision 380

FIG. PAGE
385. Repair of floor, separating flap 380
386. Repair of floor, identifying levator muscle 381
387. Repair of floor, suturing levator muscles 381
388. Repair of floor, suturing levator muscles 382
389. Repair of floor, suturing other tissues. 382
390. Repair of floor, trimming the flap 382
391. Repair of floor, closing incision 382
392. Testing size of opening, at repair of sling 383
393. Testing size of opening, operation completed 383
394. Emmet operation for repair of floor, diagrammatic 384
395. Repair of laceration into rectum, making incision 386
396. Repair of laceration into rectum, suturing rectal mucosa 386
397. Repair of laceration into rectum, isolating ends of sphincter muscle 386
398. Repair of laceration into rectum, silkworm-gut sutures 386
399. Repair of laceration into rectum, suturing levator muscles 387
400. Repair of laceration into rectum, closing incision 387
401. Flap method of repair, incision 388
402. Flap method of repair, suturing sphincter ends 388
403. Flap method of repair, suturing levator muscle 389
404. Flap method of repair, closing incision 389

REPAIR OF RECTOCELE AND CYSTOCELE

405. Extra sutures for rectocele, first row 392
406. Extra sutures for rectocele, second row 392
407. Operation for moderate cystocele, incision 394
408. Operation for moderate cystocele, separating flap 394
409. Operation for moderate cystocele, suturing fascia 394
410. Operation for moderate cystocele, closing incision 394

VAGINAL FISTULA

411. Varieties of fistulae 395
412. Operation for vesicovaginal fistula, area of denudation 403
413. Operation for vesicovaginal fistula, passing sutures 403
414. Operation for vesicovaginal fistula, flap method 405
415. Operation for vesicovaginal fistula, flap method 405

CHAPTER VI

ANATOMY OF UTERUS

416. Anterior view of uterus 409
417. Anteroposterior section of uterus 409
418. Section of uterus and tube and ovary 410
419. Reconstruction of uterus, showing shape of cavity 411
420. Uterus and adnexa in early childhood 411
421. Uterus and adnexa, age fourteen years 411
422. Uterus and adnexa, age twenty, multipara 411
423. Relative size and direction of cervix in the fetus 412
424. Comparison of the nulliparous and the multiparous uterus 412
425. Normal uterus, laid open 413
426. Normal uterine wall 413
427. Endometrium of an infant 414
428. Endometrium, age eight years 414
429. Endometrium, age eight years, high power 414
430. Endometrium, adult, midinterval 415
431. Endometrial stroma and gland, high power 416
432. Endometrium, late interval 417

FIG. PAGE
433. Endometrium, late interval, high power 417
434. Endometrium, premenstrual 417
435. Premenstrual tufting, high power 418
436. Endometrium, beginning of menstruation 418
437. Menstrual endometrium, blood in the tissues 418
438. Menstrual endometrium, exfoliation of surface 418
439. Menstrual endometrium, collapse of the glands 419
440. Postmenstrual endometrium 419
441. Senile uterine wall 421
442. Senile endometrium 421
443. Senile endometrium, high power 421
444. Gland of cervix uteri, longitudinal section 422
445. Gland of cervix uteri, cross section 422
446. Blood supply of the uterus 423
447. Blood supply of the uterus 424
448. Lymphatics of the uterus 424
449. Distribution of the uterine lymphatics to pelvic glands 425
450. Ligaments of the uterus 427
451. Distribution of peritoneum on uterus 427

INFLAMMATORY AND NUTRITIVE DISEASES OF UTERUS

452. Chronic endocervicitis, localized 434
453. Chronic endocervicitis, localized, high power 435
454. Chronic endocervicitis, diffuse 436
455. Chronic endocervicitis, diffuse, high power 436
456. Erosion of cervix, diagrammatic 439
457. Erosion of cervix, clinical appearance 439
458. Erosion of cervix, microscopic appearance 439
459. Eversion of cervical mucosa, moderate 440
460. Eversion of cervical mucosa, marked 440
461. Ulcer of cervix, low power 442
462. Ulcer of cervix, high power 442
463. Laceration of cervix, diagrammatic 444
464. Eversion of lacerated cervix. diagrammatic 444
465. Ball-shaped lacerated cervix 445
466. Unilateral laceration of cervix 445
467. Bilateral laceration of cervix, moderate 445
468. Bilateral laceration of cervix, marked 445
469. Stellate laceration of cervix 445
470. Stellate laceration of cervix 445
471. Cystic degeneration of cervix 446
472. Cystic degeneration of cervix 446
473. Linear cauterization treatment of cervix 450
474. Instruments for repair of cervix 453
475. Supplementary instruments 453
476. Repair of cervix, area of denudation and sutures 454
477. Repair of cervix, sutures tied 454
478. Repair of cervix, steps in the operation 454
479. Cystic area of cervix, diagrammatic 457
480. Excision of cystic area of cervix, diagrammatic 457
481. Excision of cystic area of cervix (Schroeder method) 458
482. Conical excision of cystic area (Sturmdorf method), the cone excised 459
483. Conical excision of cystic area, loosening flaps 459
484. Conical excision of cystic area, suturing flaps 460

FIG. PAGE
485. Conical excision of cystic area, completing operation 460
486. Hypertrophic elongation of cervix 461
487. The three divisions of the cervix 461
488. Regular wedge-shaped amputation of cervix 461
489. Regular wedge-shaped amputation of cervix 462
490. Polypi of the cervix 463
491. Section of cervical polyp, fibrous type 464
492. Section of cervical polyp, glandular type 464
493. Hyperplasia of endometrium, gross specimen 466
494. Hyperplasia of endometrium, microscopic appearance 466
495. Hyperplasia of endometrium, low power 467
496. Hyperplasia of endometrium, high power 467
497. Endometrial polyp, gross specimen 467
498. Endometrial polyp, microscopic appearance 467
499. Chronic endometritis, low power 473
500. Chronic endometritis, high power 473
501. Chronic endometritis and hyperplasia 473
502. Curettage, instruments 477
503. Curettage, patient arranged 478
504. Curettage, dilating cervix 478
505. Curettage, method of steadying the cervix 479
506. Curettage, the sharp curet 479
507. Curettage, method of using the sharp curet 479
508. Curettage, restoring the uterus to normal position 480
509. Curettage, vaginal packing for bleeding 480
510. Subinvolution of uterus, gross specimen 482
511. Subinvolution, the thickened wall 483
512. Subinvolution, diffused elastic material, inner third 483
513. Subinvolution, diffused elastic material, middle third 484
514. Subinvolution, diffused elastic material, outer third 484
515. Hypertrophy of myometrium, gross specimen 486
516. Hypertrophy, the thickened wall 487
517. Hypertrophy, microscopic details 487
518. Chronic metritis, gross specimen 488
519. Chronic metritis, the thickened wall 488
520. Chronic metritis, the round cell infiltration 489
521. Chronic metritis, the connective increase, middle third 489
522. Chronic metritis, the connective increase, outer third 489
523. Tuberculosis of endometrium, gross specimen 491
524. Tuberculosis of endometrium, low power 492
525. Tuberculosis of endometrium, high power 492
526. Tuberculosis of cervix uteri, high power 493
527. Syphilis of cervix uteri, secondary, low power 494
528. Syphilis of cervix uteri, secondary, high power 494
529. Syphilis of cervix uteri, tertiary, high power 495
530. Syphilis of cervix uteri, tertiary, high power 495
531. Syphilis of cervix uteri, tertiary, a giant cell 495
532. Echinococcus disease of uterus, gross specimen 497
533. Echinococcus hooklets 497

CHAPTER VII

RETRODISPLACEMENT OF THE UTERUS

534. Normal position of uterus, sectional view 499
535. Normal position of uterus, view from above 500

FIG. PAGE
536. Degrees of retrodisplacement 503
537. Retroflexion and retroversion 503
538. Diagnosis of retrodisplacement, mass behind cervix 506
539. Diagnosis of retrodisplacement, mass in front of cervix 506
540. Diagnosis of retrodisplacement, complicated retrodisplacement 506
541. Diagnosis of retrodisplacement, complicated retrodisplacement 507
542. Determining adhesions. 507
543. Bimanual reposition of uterus 508
544. Bimanual reposition of uterus 508
545. Bimanual reposition of uterus 508
546. Bimanual reposition of uterus 508
547. Bimanual reposition of uterus 509
548. Bimanual reposition of uterus 509
549. The hard-rubber ring pessaries 511
550. Pessary in place, showing the action 512
551. Introducing the pessary 517
552. Introducing the pessary 517
553. Introducing the pessary 517
554. Introducing the pessary 517
555. Introducing the pessary 518
556. Introducing the pessary 518
557. Mercury pressure treatment 524
558. Effect of vaginal packing in knee-chest posture 524
559. Patient in knee-chest posture 525
560. Patient in knee-chest posture, ready for vaginal packing 525
561. Principles of operative treatment for uterine retrodisplacement 528
562. Example operation for round ligament shortening 534
563. Example operation for round ligament shortening 534
564. Forceps for round ligament shortening 535

PROLAPSE OF THE UTERUS

565. Stages in prolapse of the uterus 536
566. Prolapse of uterus, first degree 536
567. Prolapse of uterus, second degree 536
568. Prolapse of uterus, third degree 536
569. Prolapse of uterus and bladder 537
570. Prolapse of uterus in a nullipara 538
571. Prolapse of uterus in a virgin 538
572. Diagnosis of prolapse, bimanual examination 539
573. Diagnosis of prolapse, special test for cystocele 539
574. Diagnosis of prolapse, mass at vulva 540
575. Diagnosis of prolapse, mass in vagina 540
576. Simple ring pessaries 542
577. The Menge pessary 542
578. The Gehrung pessary 543
579. Introducing the Gehrung pessary 544
580. Introducing the Gehrung pessary 544
581. Introducing the Gehrung pessary 545
582. The Hewitt pessary 546
583. The cup and belt pessary 547
584. Principles of treatment for prolapse, childbearing period 548
585. Principles of treatment for prolapse, past menopause, vaginal operation 549
586. Principles of treatment for prolapse, past menopause, abdominal operation . . . 549

FIG. PAGE
587. Lateral displacement of uterus by tumor 550
588. Lateral displacement of uterus by adhesions 551
589. Inversion of uterus, mass outside 551
590. Inversion of uterus, mass in vagina 551
591. Diagnosis of inversion of uterus 552

CHAPTER VIII

MYOMA OF UTERUS

STRUCTURAL ELEMENTS

592. Structure of ordinary myoma 554
593. Structure of ordinary myoma, high power 554
594. Structure of adenomyoma 555
595. Gland and stroma of an adenomyoma 555

RELATION TO UTERINE WALL

596. Small encapsulated interstitial myoma 555
597. The compressed tissue forming the capsule 555
598. The capsule, low power 556
599. The capsule, high power 556
600. Multiple myomata 556
601. Multiple myomata 557
602. A single large myoma 557
603. Marked distortion of uterus by myomata 557
604. Symmetrical enlargement of uterus 558
605. Subperitoneal myomata 558
606. Submucous myomata 559
607. Small myoma near endometrium 560
608. Compression of endometrium by myoma 560
609. Large submucous myoma 561
610. Pediculated submucous myoma, projecting into vagina 561
611. Pediculated submucous myoma, projecting outside vagina 561
612. Diffuse adenomyoma of uterus 562
613. Diffuse adenomyoma of uterus, microscopic appearance 563
614. Pediculated submucous adenomyoma 563
615. Pediculated submucous adenomyoma, microscopic appearance 564
616. Adenomyoma of uterine horn 564
617. Adenomyoma of uterine horn, low power 565
618. Adenomyoma of uterine horn, high power 565
619. Adenomyoma of broad ligament 566
620. Adenomyoma of broad ligament, diagram of cavity 566
621. Adenomyoma of broad ligament, high power 566
622. Distribution of adenomyomata 567
623. Adenomyomata of tube 567
624. Demonstrating origin from tubal mucosa 568
625. Adenomyoma of rectovaginal septum 568
626. Adenomyoma of sigmoid 569
627. Hyaline degeneration in a myoma 570
628. Extensive necrobiosis 571
629. Red degeneration 572
630. Cystic change 573
631. Extensive cystic formation 574
632. Suppuration 575
633. Necrosis, small area 575

SECONDARY CHANGES

FIG. PAGE
634. Necrosis of entire myoma 576
635. Perforation of uterine wall by necrotic myoma 577
636. Necrosis of submucous myoma 578
637. Sarcomatous degeneration of subperitoneal myoma 579
638. Sarcomatous degeneration, microscopic appearance 580
639. Sarcomatous degeneration of submucous myoma 580
640. Sarcomatous degeneration of submucous myoma, high power 581
641. Sarcoma of cervical stump after supravaginal hysterectomy 581

ASSOCIATED CONDITIONS

642. Carcinoma of cervix with myoma 582
643. Carcinoma of corpus with myoma 583
644. Early pregnancy with myoma 584
645. Advanced pregnancy with myoma 584
646. Serious adhesions with adenomyoma 584

DIFFERENTIAL DIAGNOSIS

647. Pregnancy with marked retrodisplacement 585
648. Pregnancy with moderate retrodisplacement 585
649. Pregnancy at mid-term 585
650. Pregnancy at full term 585
651. Irregular shapes that pregnant uterus may present 586
652 to 662. Differential diagnosis between myoma and inversion of uterus . . . 586-587
663. Differential diagnosis between myoma and retrodisplacement 588
664. Differential diagnosis between myoma and retrodisplacement 588
665. Myoma and ascites 588
666. Myoma and ascites 588

TREATMENT

667. Diagram showing principles of myomectomy and hysterectomy 595

CHAPTER IX

MALIGNANT TUMORS OF UTERUS

CARCINOMA OF CERVIX UTERI

668. Early squamous carcinoma of cervix, small ulcer 601
669. Early squamous carcinoma of cervix, extensive superficial ulcer 601
670. More advanced squamous carcinoma, papillary type 601
671. More advanced squamous carcinoma, inverting type 601
672. More advanced squamous carcinoma, marked inversion 601
673. Diagnostic clipping from cervix 602
674. Section of removed uterus, very early squamous carcinoma 602
675. High power of same 603
676. Diagram, progressive development of squamous carcinoma 605
677. Squamous carcinoma of cervix, low power 605
678. The penetrating cell columns 605
679. The penetrating cell columns, high power 606
680. Carcinoma cells inside a cervical gland 606
681. Epithelial pearl from cervix 606
682. Carcinoma cells in a lymph channel 606
683. Carcinoma cells in a lymph gland 607
684. Adenocarcinoma of cervix uteri, stages in development, diagrammatic 607
685. Early adenocarcinoma of cervix 608
686. Early adenocarcinoma of cervix, papillary type 608

FIG. PAGE
687. Adenocarcinoma of cervix, microscopic appearance 608
688. Adenocarcinoma of cervix, high power 609
689. Adenocarcinoma of cervix, low power 609
690. Adenocarinoma of cervix, effect of radium treatment on cells 610
691. Carcinoma cells under vaginal wall 610
692. Advanced carcinoma of cervix 611
693. More advanced carcinoma of cervix, involving ureters 612
694. Involvement of parametrium and glands 613
695. Pyometra from carcinoma 613
696. Carcinoma opening into bladder and rectum 614
697. Obstruction and dilatation of ureters and kidneys from a carcinoma of cervix . 615
698. Principles of radical operation 626
699. Radium treatment for carcinoma of cervix 627
700. X-ray treatment for carcinoma of cervix 629
701. Acetone treatment for carcinoma of cervix 631

CARCINOMA OF CORPUS UTERI

702. Stages in development of carcinoma of corpus uteri, diagrammatic 633
703. Early carcinoma of corpus 634
704. Early carcinoma of corpus 634
705. More advanced carcinoma of corpus 634
706. Carcinoma of corpus uteri, low power 635
707. Carcinoma of corpus uteri, high power 635
708. Carcinoma of corpus uteri, the advancing edge 635
709. Carcinoma of corpus uteri, entire wall 635
710. Carcinoma of corpus uteri, low power 636
711. Carcinoma of corpus uteri, high power 636
712. Advanced carcinoma of corpus uteri 636

CHORIOEPITHELIOMA OF UTERUS

713. Small chorioepithelioma of uterus 637
714. Large chorioepithelioma of uterus 637
715. Section of chorioepithelioma 638
716. Section of chorioepithelioma, high power 638
717. Syncytial cells and Laughan's cells 639

SARCOMA OF UTERUS

718. Small sarcoma of uterus 639
719. Larger sarcoma of uterus 639
720. Sarcomatous polyp projecting from cervix 640
721. The uterus removed, extensive sarcoma 640
722. Sarcoma of uterus, section 641
723. Sarcoma of uterus, high power 641
724. Sarcoma of uterus, the advancing edge 641
725. Submucous sarcoma causing partial inversion 642
726. Grape-like sarcoma of cervix 642

CHAPTER X

PELVIC INFLAMMATION

727. Section of genital tract, showing continuous opening into peritoneal cavity . . . 645
728. Lumen of fallopian tube at different portions 646
729. Mucosa of tube at uterine end 646
730. Mucosa of tube in ampulla 647
731. Connective tissue areas of pelvis 651
732. The three spaces in the pelvis—peritoneal, parametrial, ischiorectal 653
733. Exudate in different spaces 653

FIG. PAGE
734. Parametrial abscess 653
735. Extensive exudate in pelvis 653
736. Thrombophlebitis 654
737. Instruments for opening pelvic abscess 660
738. Vaginal incision into pelvic abscess 661
739. Vaginal incision into pelvic abscess 662
740. Arranging drainage tubes 663
741. Arranging drainage tubes 563
742. Details of proctoclysis 673
743. Chronic salpingitis, mild 677
744. Chronic salpingitis with exudate 678
745. Pyosalpinx 678
746. Chronic salpingitis, section 679
747. Chronic salpingitis, section 679
748. Chronic salpingitis, low power 679
749. Chronic salpingitis, high power 680
750. Chronic salpingitis, details of plasma cells 680
751. Pyosolpinx 680
752. Pyosalpinx, section 681
753. Pyosalpinx, very large 681
754. Salpingitis with prolapsed tube 682
755. Pyosalpinx with pelvic abscess 682
756. Pyosalpinx with extensive adhesions 682
757. Tuboovarian abscess 683
758. Diffuse pelvic suppuration 683
759. Matting together of pelvic organs by inflammation 684
760. Hydrosalpinx 684
761. Hydrosalpinx, section 685
762. Hydrosalpinx, high power 685
763. Nodular salpingitis 685
764. Nodular salpingitis, section 686
765. Nodular salpingitis, high power 686
766. Old adhesions in pelvis 686
767. Pelvic cellulitis 687
768. Sites for pelvic cellulitis 688
769. Chronic oophoritis 689
770. Differential diagnosis, mass low behind uterus 691
771. Differential diagnosis, mass high behind uterus 691
772. Differential diagnosis, exudate in parametrium 692
773. Differential diagnosis, cyst in parametrium 692
774. Differential diagnosis, myoma in parametrium 693
775. Differential diagnosis, periureteral exudate 693
776. Baking apparatus 696
777. Extension of gonorrheal inflammation in uterus 704
778. Extension of streptococcic inflammation in uterus 705

CHAPTER XI

OTHER AFFECTIONS

779. Pelvic tuberculosis, peritoneal type 714
780. Tubal tuberculosis 714
781. Tubal tuberculosis, section 715
782. Tubal tuberculosis, high power 716
783. Tubal tuberculosis, low and high power 717
784. Sites for tubal pregnancy 720

FIG. PAGE
785. Tubal pregnancy 720
786. Tubal pregnancy, ruptured 720
787. Tubal pregnancy, increasing blood mass 721
788. Specimen from tubal pregnancy, early 721
789. Specimen from tubal pregnancy, later 722
790. Tubal pregnancy, low power 722
791. Tubal pregnancy, high power 722
792. Tubal pregnancy, tube ruptured at isthmus 723
793. Tubal pregnancy, very free intraperitoneal hemorrhage 723
794. Tubal abortion, specimen 723
795. Tubal abortion, extruded embryo 723
796. Tubal abortion, the hematocele 724
797. Tubal abortion rupture into broad ligament 725
798. Tubal abortion, broad ligament hematoma 725
799. Insterstitial pregnancy 726
800. Interstitial pregnancy, ruptured 727
801. Lithopedion from tubal pregnancy 728
802. Lithopedion from tubal pregnancy, the specimen 728
803. Bilateral tubal pregnancy 728
804. Appearance of uterine mucosa in tubal pregnancy 731
805. Sarcoma of tube 744
806. Varicose veins of broad ligament 745

CHAPTER XII

OVARIAN AND PAROVARIAN TUMORS

807. Relation of ovary to broad ligament 747
808. Section of ovary 747
809. Graafian follicle and ovarian stroma 748
810. Follicles in ovary of fetus of seven months 749
811. Follicles in ovary of child of two years 750
812. Follicles in ovary of girl of twelve years 751
813. Small follicle in adult ovary 752
814. Developing follicle 753
815. Mature follicle 754
816. Cumulus of mature follicle 755
817. Corpus luteum, diagrammatic 755
818. Corpus luteum, specimen 755
819. Corpus luteum, section 755
820. Corpus luteum, section of entire ovary 757
821. Corpus luteum, high power of luteum cells 757
822. Corpus albicans 758
823. Corpus albicans, scars in surface of ovary 758
824. Senile ovary, showing old corpora albicantia 759
825. Senile ovary, showing fibrous change and absence of follicles 759
826. Parovarian tubules, in embryo 761
827. Parovarian tubules, in adult 762
828. Follicular cysts 763
829. Follicular cysts, section 764
830. Corpus luteum cysts 764
831. Wall of corpus luteum cyst 765
832. Specimen, small cyst of ovary 766
833. Specimen, small cyst of ovary 766
834. Tuboovarian cyst 766

FIG. PAGE
835. Pseudomucinous cyst 767
836. Pseudomucinous cyst, large 768
837. Pseudomucinous cyst, section 769
838. Pseudomucinous cyst, high power 769
839. Comparison of cyst cells 770
840. Serous cyst, small 770
841. Serous cyst, larger 771
842. Serous cyst, papillary growths 771
843. Serous cyst, papillary growths 772
844. Papillary growth, section 772
845. Papillary growth, benign 773
846. Papillary growth, malignant 773
847. Papillary growth, malignant, high power 773
848. Dermoid cyst 777
849. Dermoid cyst, with teeth 777
850. Dermoid cyst, with hair 778
851. Dermoid cyst, with ball contents 778
852. Ball contents, showing different types 779
853. Unusual hair growth from dermoid cyst 780
854. Wall of dermoid cyst 780
855. Wall of dermoid cyst, high power 780
856. Carcinoma beginning in dermoid cyst 781
857. Carcinoma in dermoid cyst, section 781
858. Carcinoma in dermoid cyst, high power 782
859. Endometrial cyst of ovary 782
860. Endometrial cyst, showing adhesions 783
861. Endometrial cyst, causing uterine adenomyoma 783
862. Endometrial cyst, causing rectovaginal adenomyoma 784
863. Endometrial cyst, section of whole ovary 785
864. Endometrial cyst, low power 786
865. Endometrial cyst, high power 787
866. Endometrial cyst, eventuating in ureteral constriction 788
867. Testing the mobility of a pelvic cyst 789
868. Testing the mobility of a pelvic cyst 789
869. Large ovarian cyst 793
870. Large ovarian cyst 793
871. Marked ascites 794
872. Marked ascites, dullness when recumbent 794
873. Marked ascites, dullness when standing 795
874. Marked ascites, pyramidal abdomen 795
875. Marked ascites, abrupt rise at lower part 795
876. Obesity mistaken for ovarian tumor 796
877. Abdomen enlarged from distended bladder 796
878. Ovarian cyst, with long pedicle 797
879. Ovarian cyst, with torson of pedicle 798
880. Ovarian cyst, with pregnancy 800
881. Fibroma of ovary 801
882. Fibroma of ovary, section 801
883. Fibroma of ovary, high power 802
884. Carcinoma of ovary, from papillary cyst 802
885. Carcinoma of ovary, primary solid tumor 803
886. Medullary carcinoma of ovary 803
887. Medullary carcinoma of ovary, high power 804

FIG. PAGE
888. Krukenberg tumor of ovary 805
889. Krukenberg tumor of ovary, section 805
890. Krukenberg tumor of ovary, distribution of growths 806
891. Krukenberg tumor of ovary, low power 806
892. Krukenberg tumor of ovary, high power 806
893. Sarcoma of ovary, secondary 807
894. Sarcoma of ovary, secondary 807
895. Parovarian cyst 808
896. Parovarian cyst, displacing uterus 809
897. Parovarian cyst, bilateral 809
898. Parovarian cyst, drawing from specimen 809
899. Parovarian cyst, microscopic section 810
900. Parovarian cyst, very large 810

CHAPTER XIII

MALFORMATIONS

901. Development of genital organs, indifferent stage 813
902. Development of genital organs, female 813
903. Development of genital organs, male 813
904. Development of external genitals 814
905. Imperforate hymen 817
906. Imperforate hymen, section 817
907. External genitals in absence of vagina 818
908. Double vagina 819
909. Double vagina, speculum in place 819
910. Malformations of uterus 821
911. Atresia of cervix 822
912. Double uterus 822
913. Pregnancy in a septate uterus 822
914. Pregnancy in a rudimentary horn of uterus 823
915. An hermaphrodite 824
916. An hermaphrodite, details of external genitals 825
917. Hypospadias, external genitals 825
918. Hypospadias, section through pelvis 825

CHAPTERS XIV TO XVIII

MISCELLANEOUS

919. Obstructive dysmenorrhoea, anteflexion of cervix 848
920. Membranous dymenorrhoea, microscopic appearance of membrane 853
921. Stem pessaries for dysmenorrhoea 859
922. Dudley operation for stenosis of cervix 861
923. Dudley operation for stenosis of cervix 861
924. Operation for stenosis of vaginal opening 868
925. Curve of Ott 910
926. Continuous gauze-strip sponges 929
927. Conservative surgery of ovary and tube 942
928. Strapping the abdomen 947
929. Dressing the abdominal wound 948
930. Dressing the abdominal wound 948
931. Care of the drainage tube 951
932. Pitcher douche 959
933. Vulvular dressing 959
934. Catheterization 960

DISEASES OF WOMEN

CHAPTER I

GYNECOLOGIC EXAMINATION METHODS

The physician who wishes to do accurate work in diagnosis must be in possession of certain facts, as follows:

Knowledge of the anatomy and physiology of the organs involved.
Reliable history and examination of the patient.
Knowledge of the diseases to which the parts are liable.

The essential organs in the group of structures involved in gynecologic* diseases are shown in Figs. 1, 2, 3, 4, 5 and 6. They are as follows:

1. The **ovaries**, in which the ova are formed.
2. The **fallopian tubes**, which conduct the ova from the ovaries to the uterus.
3. The **uterus**, which receives and nourishes the fertilized ovum and expels the fetus at term.
4. The **vagina**, which is the connecting link between the uterus and the outside world.

There are also several accessory structures—namely, the external genitals, the perineum, the pelvic floor, the pelvic peritoneum and the pelvic connective tissue.

The gross anatomy of these organs and the prominent facts in their physiology are sufficiently known to you, from general anatomic and physiologic study, to permit immediate consideration of the methods of obtaining the facts on which a diagnosis may be based.

HISTORY

When called to see a patient with pelvic disease, the first thing to do is to obtain what information the patient can give concerning her trouble. This information, obtained from the patient or her friends, is designated the history, and should include facts covering all the important points. The following outline indicates the information to be obtained, and also pre-

---

*As to the pronunciation of "gynecology," the weight of authority is decidedly in favor of soft g, short y and the accent on the third syllable—jin e kol′ o je (Webster's Unabridged Dictionary, Century Dictionary, Standard Dictionary, and the following medical dictionaries—Gould's, Keating's, Stedman's, and Dorland's). A few authorities differ, some favoring soft g and long y, and others favoring hard g and long y.

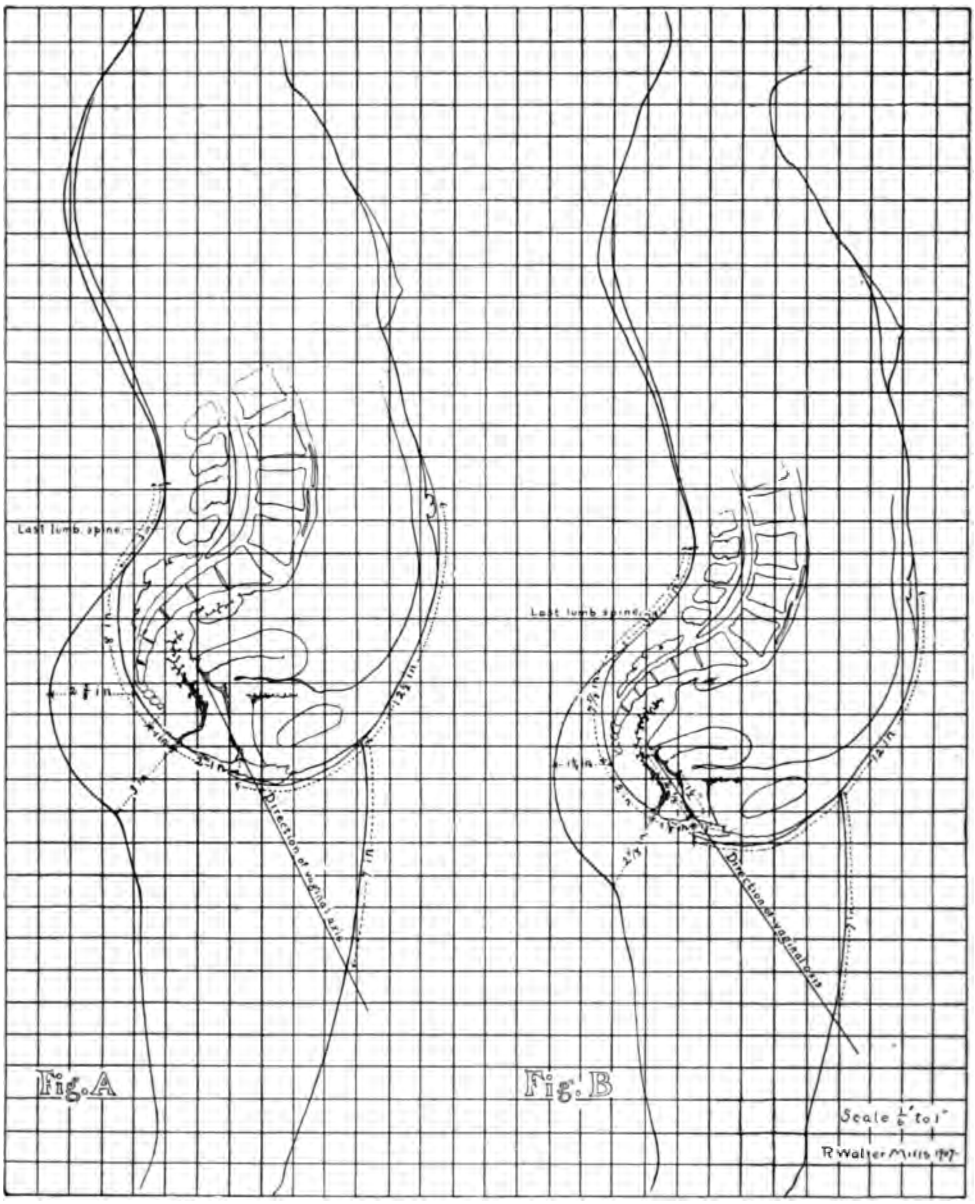


Fig. 2.—A. Exact contour and measurements of the woman selected for Fig. 1. B. Exact contour and measurements of another model, presenting a more pronounced lumbar and abdominal curve. The small squares represent one-inch squares at life size. (R. Walter Mills.)

(A) Artist's model, aged 28, mother of two children (6 and 8 years old respectively), has worn corset practically none, is in good health and fairly muscular. Height 5 ft. 7 in., weight 140 lb., bust measure 36 in., waist 27 in. (2 in. above umbilicus), circumference at umbilicus 30 in., hips 39 in., thigh 22½ in. (2 in. below gluteal crease), anteroposterior diameter of body at waist 6¾ in., anteroposterior diameter of thigh (2 in. below gluteal crease) 6⅝ in. The other data are given on the outline. To conform to the so-called "perfect form" the hips should be a trifle larger and the weight somewhat more.

(B) Young woman, aged 27, never pregnant, has worn corset very little, is in good health and muscular. Height 5 ft. 4 in., weight 114 lb., bust measure 32 in., waist 24 in. (2 in. above umbilicus), hips 38 in., thigh 22 in. (2 in. below gluteal crease), anteroposterior diameter of body at waist 6½ in., anteroposterior diameter of thigh (2 inches below gluteal crease) 6⅝ in. The other data are given on the outline. The lumbar and abdominal curves are more pronounced than in A.

The numerous exact measurements given in Fig. 2 constitute valuable data to guide in medical drawings of this character.

sents a convenient order in which to question the patient and record the systematic history:

Preliminary Questioning—To ascertain the principal complaint (character, location, duration, etc.) and put the patient at ease.

History Record

Social Items—Name, address, age, married, occupation.

Previous Health—General health, abdominal inflammation, nervous disturbances, operations, etc.

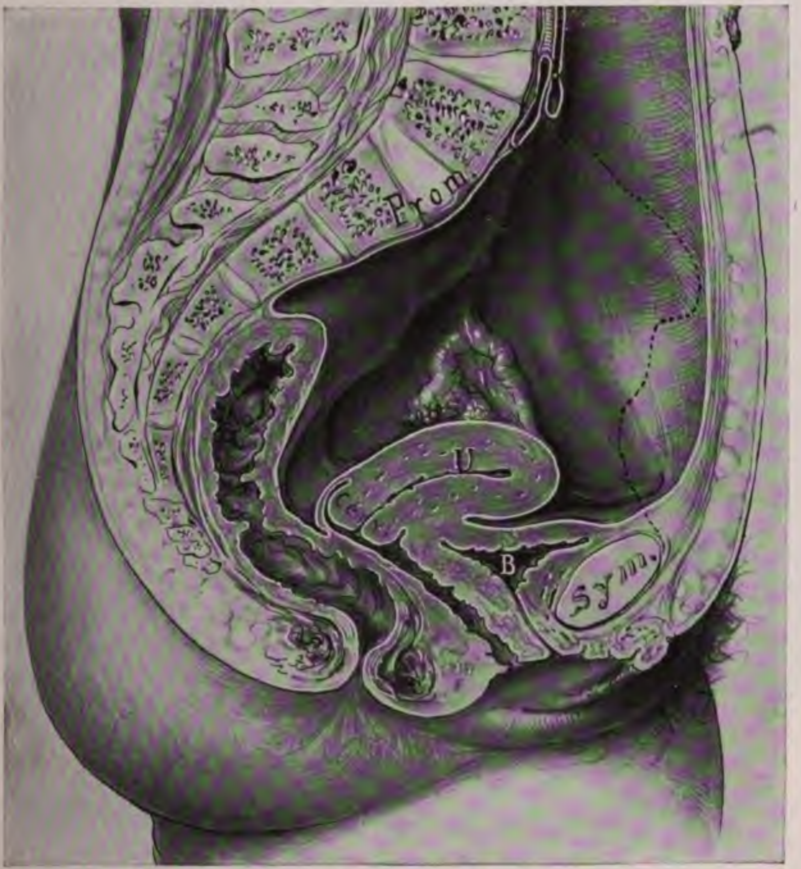


Fig. 3.—Anteroposterior section of pelvis. Showing left half of body, with intestines removed. (Kelly—*Operative Gynecology*.)

Pregnancies—Confinements, miscarriages, sterility.

Menstrual History—Beginning, regularity, duration, amount, pain, last two menstruations.

Beginning of Present Trouble—When, how, cause.

Principal Symptoms—Character, time of onset, duration of each.

Disability—Confinement to bed, interference with work, etc.

Complications—Character, onset, duration.

Family History—In special cases, nervous disturbance, tuberculosis, etc.

Previous Treatment—Different kinds, results.

Summary of chief symptoms demanding relief.

Preliminary Questioning.—Of what symptoms does the patient complain? A question directed to bring out this information will at once enlist the patient's interest and relieve any temporary embarrassment she may feel. The prominent symptoms are soon given, and serve to indicate lines of special inquiry when taking the systematic history of the case. The systematic inquiry is begun at some convenient point in the patient's narrative.

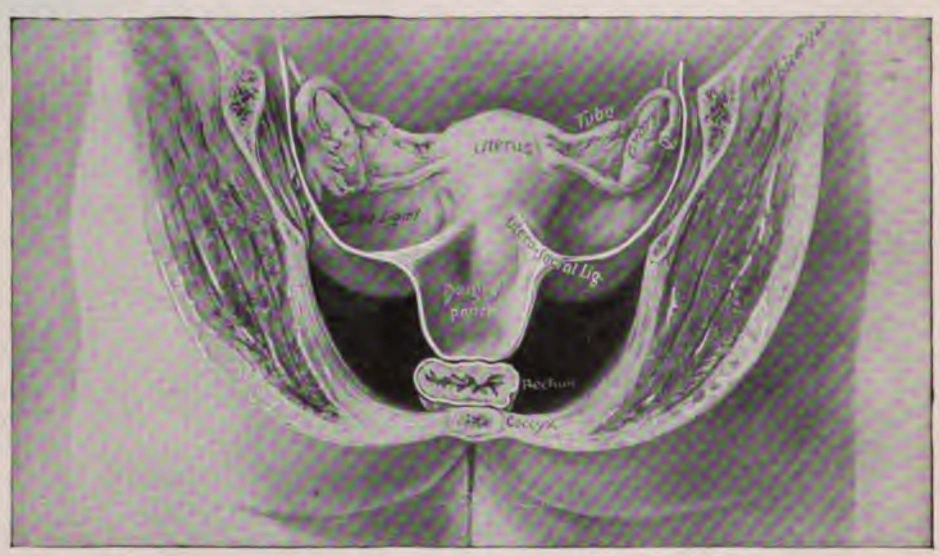


Fig. 4.—View of pelvic organs from behind. (Dickinson—*American Text-Book of Obstetrics.*)

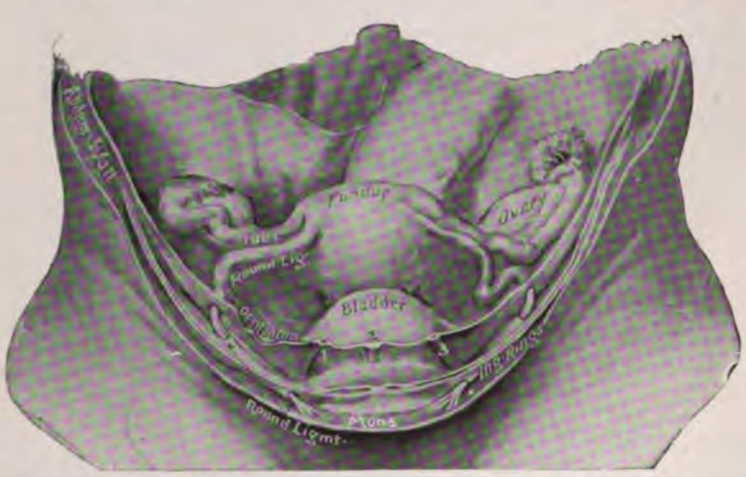


Fig. 5.—Pelvic organs from in front. (Dickinson—*Am. Text-Book of Obstetrics.*)

Social Items.—It is well to put down at this time the facts not strictly medical, for if postponed some of them are liable to be overlooked altogether. Record accurately the patient's name, address, age, whether married or single; and if single, the occupation; if married, how long. If she has been married more than once, or if a widow or if living apart from her husband, she will probably mention the fact and also any correlated facts bearing on the present disturbance. In some cases it may be advisable, for business reasons, to note other items of information—for example, the husband's occupation and business address.

Previous Health.—Ascertain whether or not the patient was well and strong before the beginning of the present trouble. Any serious illness, whether connected with the pelvic organs or not, should be inquired into. It may be an important factor in the origin of the present disturbance or it may point to some complication which must be taken into consideration in the treatment. Of particular importance are serious nervous disturbances, attacks of abdominal inflammation, and operations.

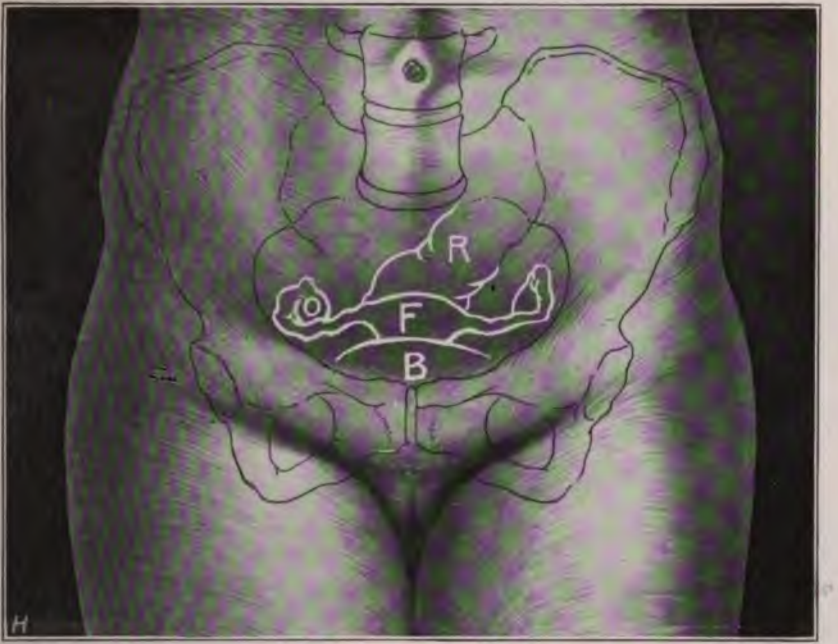


Fig. 6.—Relation of the pelvic organs to the external surface of the body. (Dickinson—*American Textbook of Obstetrics.*)

Pregnancies.—LABORS.—Has the patient had children? If so, how many and when? Was there serious trouble during any labor, or during any pregnancy, or afterward? Make particular inquiry as to whether the labor was so severe that instruments had to be used, or whether the labor was followed by indications of sepsis or of laceration of the pelvic floor or cervix uteri. If after any labor the patient was sick in bed for two or three weeks, with pain in the lower abdomen and fever, she probably had sepsis in some form, the usual form being septic endometritis. Another very common history of mild sepsis is that the patient gets up as usual, but does not feel strong and after a few days takes a "backset" and returns to bed or drags about the house, with soreness in the lower abdomen, some fever, and marked weakness. Of course, delays in convalescence after labor may be caused by complications outside the genital tract, but generally they are due to some trouble in the genital tract, such as infection of the uterus or subinvolution of the uterus or laceration of the pelvic floor.

MISCARRIAGES.—Have there been any miscarriages? If so, how many and when and at what stage of pregnancy did each occur? What was the cause of each miscarriage? Did it follow some accident, or was it due to some acute disease such as typhoid fever or pneumonia? If there have been repeated miscarriages, inquire carefully and circumspectly as to evidences of syphilis. Have the miscarriages been brought about intentionally (criminal abortion)—if so, in what way? Was each miscarriage complete and no trouble following? When incomplete, part of the fetal membranes are retained in the uterus and cause a persistent bloody discharge. Sepsis also may occur.

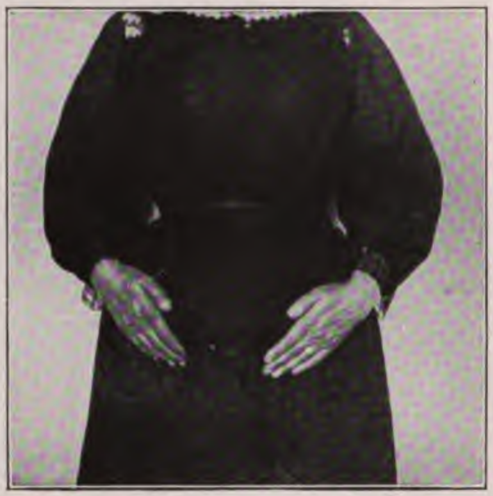


Fig. 7.—Indicating general pelvic distress. This distress may be due to bladder or uterine or tubal or ovarian disease on one or both sides.

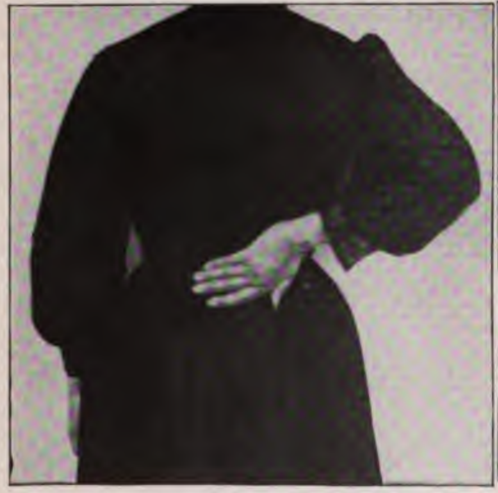


Fig 8.—Indicating lumbar backache.

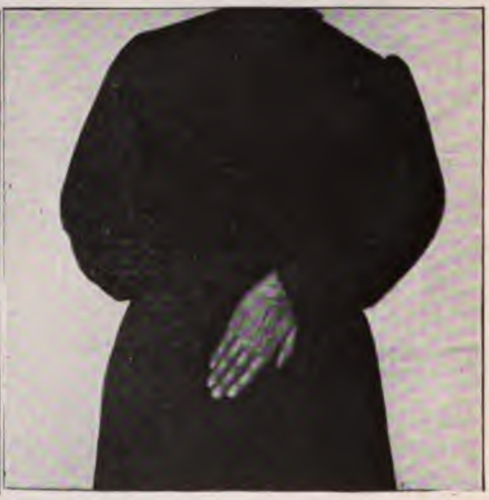


Fig. 9.—Indicating sacral backache.

STERILITY.—When the patient has been married a long time and there has been no pregnancy, it is well to inquire as to why there has been no pregnancy, and if treatment has been undertaken for the sterility.

Menstrual History.—How old was the patient when she began to menstruate? Has the menstruation been regular and of proper duration and amount, and free from severe pain? If there has been menstrual disturbance—for example, absence of menses, or excessive menstruation or irregular menstruation or intermenstrual bleeding—ascertain the duration and severity of each. Invariably ascertain the date and duration of the last two menstruations that pregnancy may be excluded.

Beginning of Present Trouble.—How long has the patient been sick? Ascertain accurately when the present trouble began. If it has been of long duration, pass back of the several exacerbations and get the approximate date of the first acute attack or first appearance of decided symptoms. What were these first symptoms? How severe were they? What was done for them? What caused the trouble at that time? Had there been a severe sick spell or an injury of any kind? Had there been a labor or miscarriage or menstrual disturbance or recent marriage or extra work or anything that might have acted as a cause?

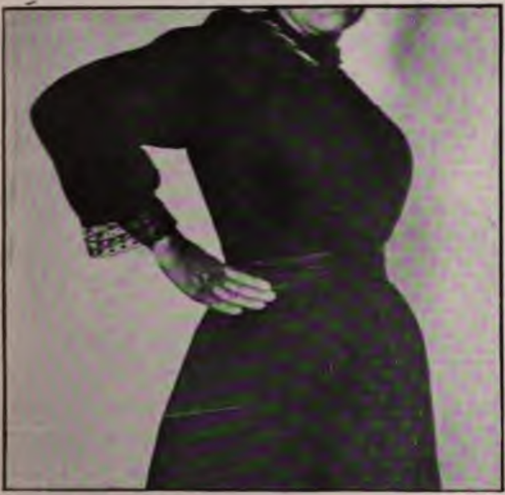


Fig. 10.—Indicating pain in the region of the right kidney.

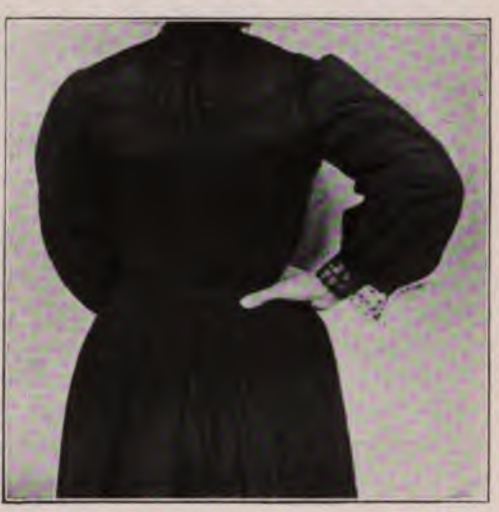


Fig. 11.—Another common way of indicating the dragging pain that accompanies disease and displacement of the kidney.

Character and Duration of Principal Symptoms.—Get an account of the present trouble from the day it began down through the important changes to the date of consultation. This does not mean to waste time with a mass of unnecessary detail but to ascertain, by well directed inquiries, the order of development and duration of the principal symptoms, such as pain, fever, swelling, discharge, etc.

Locate definitely the site of the pain or tenderness or other distress complained of. Is it in the tubal region or appendix region or over the uterus or about the ureter or kidney? Have the patient point out the exact location of the pain. Figs. 7 to 11 indicate the location of the pain in various affections. This definite localization helps to clarify the situation and makes the patient more careful and reliable in her statements. Of course, no diagnosis should be attempted from such necessarily uncertain localization by the patient. This simply indicates what organ or group is probably affected and enables the physician to question the patient more definitely and accurately before beginning the physical examination.

Ascertain the frequency and duration of the exacerbations of the disease. Has the trouble been getting worse gradually and continuously, or have there been exacerbations followed by remissions, with partial or complete disappearance of the symptoms?

Disability.—How much of the time has the patient been confined to bed? If able to be up and about part of the time or all the time, how much work or walking or shopping has she been able to do? Is the patient engaged in any work aside from her household duties? If so, what is it and has it any bearing on the origin or continuation of the present trouble? Does she do any of her own housework? If so, how much? Is it executed with facility, as when she was well, or is there pain and disability? Ascertain carefully the character of the distress associated with the work. What time of day does it come on, where is it located, is it a sharp pain or a dull aching or a dragging weight and pressure? What posture aggravates or relieves it, does it necessitate lying down, does it occur soon after rising, is it present every day, does it vary from week to week or month to month? Ascertain also the effect on the general health and nutrition. How much has the patient lost in weight or has she gained?

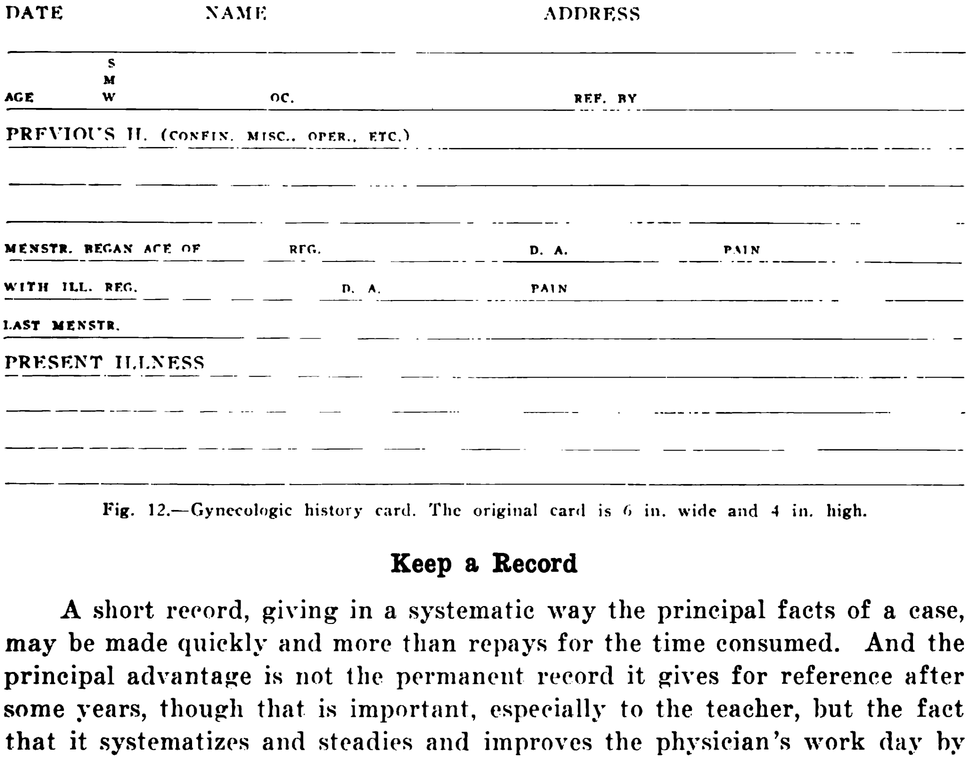
Complications.—Inquire concerning complications or associated diseases. Frequently there are complicating bladder or rectal or other local disturbances, and the extent of these should be determined. Inquiry should be made, also, for symptoms of diseases of remote organs, either complications of the pelvic trouble or intercurrent diseases. All the vital organs of the patient must be considered in estimating the influence of the pelvic disease and in forming the plan of treatment for it. Many serious mistakes in diagnosis and in treatment have occurred because the physician permitted some marked local lesion to obscure his vision of the whole patient.

In addition to the heart, lungs, kidneys, and digestive tract, the condition of the patient's blood, as indicated by her color, and the condition of the nervous system, as indicated by her appearance and actions, should be considered; and if there is evidence of disease in any direction, further investigation should be carried out.

Family History.—In some cases certain items of the family history are important, particularly nervous disturbances, tuberculosis and cancer—though the influence of family tendency to cancer has been much exaggerated. Other family items of importance in gynecologic cases are hemophilia and menstrual peculiarities, especially very late or very early menopause.

Previous Treatment.—Question the patient as to the character and duration of the previous treatment and its apparent effect. Was it internal treatment or local treatment at home (douches, vaginal suppositories, or tablets or tampon-capsules) or local treatment at office (vaginal applications, tampons, intrauterine treatment) or operation (curetting, repair of pelvic floor or cervix, vaginal section or abdominal section).

Summary.—After completing the history and before beginning the examination, fix in mind the chief symptoms for which the patient seeks relief. Keep these in mind while making the examination and endeavor to find the lesion or condition that causes each of them. These symptoms serve to indicate the directions for special investigation. The diagnosis should be made, to a considerable extent, as the examination progresses. Before finishing the examination, you should have formed an opinion as to whether or not you have found the cause or causes of the symptoms which brought the patient to you.



DATE NAME ADDRESS

AGE S M W OC. REF. BY

PREVIOUS IL. (CONFIN., MISC., OPER., ETC.)

MENSTR. BEGAN AGE OF REG. D. A. PAIN

WITH ILL. REG. D. A. PAIN

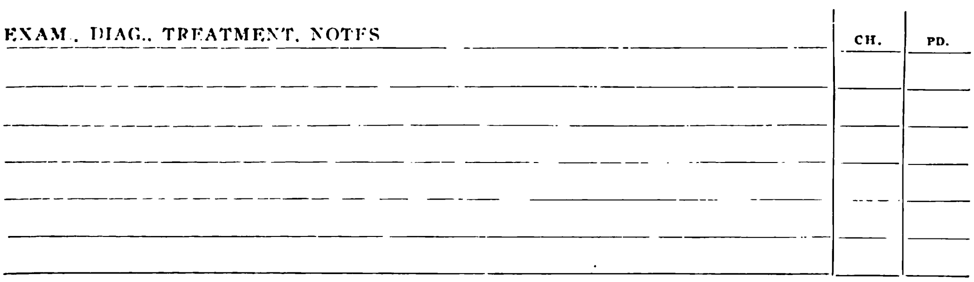
LAST MENSTR.

PRESENT ILLNESS

Fig. 12.—Gynecologic history card. The original card is 6 in. wide and 4 in. high.

Keep a Record

A short record, giving in a systematic way the principal facts of a case, may be made quickly and more than repays for the time consumed. And the principal advantage is not the permanent record it gives for reference after some years, though that is important, especially to the teacher, but the fact that it systematizes and steadies and improves the physician's work day by



EXAM., DIAG., TREATMENT, NOTES CH. PD.

Fig. 13.—Reverse side of history card. Only a part of the cards are shown, just sufficient to show printing and arrangement.

day. Such an account of the case in black and white, referred to frequently as the patient returns for treatment, is a constant stimulus to accurate diagnosis and a constant help in the treatment, particularly if the case is a long continued one. Again, in court a physician is supposed to have some record of his work. You may at any time be called upon to testify as to the exact findings in the case of some patient whom you saw one or two or three years before.

The record should embody the important facts in the history, in the examination findings, in the treatment given, and in the subsequent progress of the case. The great drawback to records is the time required to make them. In order to make them at all, the physician must have some arrangement by which the record may be made in a very few minutes. This is where printed forms are advantageous. On a printed form the physician may, in a few minutes, put down the notes necessary to make an accurate account of the case.

Record cards, printed as desired, and aranged as a card index, constitute a very convenient record for the busy practitioner, and at a moderate cost. The author uses 4 x 6 cards, printed as shown in Figs. 12 and 13. The regular history card is white. If the patient is subjected to operation, a buff "operation card" is added. If one does not wish to invest in specially prepared cards and holders, a start may be made with some blank cards of the desired size, arranged upright in the ordinary desk drawer.

For hospital records, sheets of letter-head size are generally used, the various sheets for each case being assembled in a folder for filing. This system may be used for private work if preferred.

Is a Pelvic Examination Required?

After obtaining all the information the patient can give concerning her illness, the next step is to make the physical examination, provided there are symptoms making such an examination necessary.

In the case of a **virgin,** pelvic examination is rarely indicated until after general therapeutic measures have been tried and have failed to give relief. Occasionally a young woman or a girl will present such serious symptoms that an examination is indicated at the first visit, but such cases are extremely rare.

On the other hand, in the case of a **married woman,** if decided pelvic symptoms are present, an examination should, as a rule, be made at once, particularly if there has been previous treatment without satisfactory result.

If the patient is **menstruating,** the examination is of course postponed, unless the symptoms are serious and urgent. A non-menstrual bloody discharge is not a contraindication to examination, but rather an additional indication for it.

If the patient is extremely anxious to avoid the examination, treatment without it may be tried for a while in a suitable case, even though immediate examination seems decidedly preferable. But the physician should be cautious of assuming responsibility for the treatment of alleged conditions which he has not been allowed to investigate.

When a girl is examined, her mother or some other relative should be present.

PHYSICAL EXAMINATION

Physical examination consists of the general and the local examination. The **general examination** should pe pursued far enough to give a reliable idea of the general physical condition, to show any serious disturbance and to indicate whether the patient's disability is probably due to pelvic disease or to some extrapelvic trouble.

The physician must consider the **whole patient.** His work is to ascertain what is troubling the patient—in whatever part of the body the disease may be located, and whatever organ or organs may be affected. Furthermore, it is not enough to find one well-marked disease. All of the important troubles present, both organic and functional, should be found, for then only is the physician in a position to judge accurately as to how far each disease is responsible for the patient's disability and what the plan of treatment should include and what the result will probably be. To do this the physician, either personally or otherwise, must employ in gynecologic cases various methods of examination that belong to other departments of medicine. The detailed consideration of these would be out of place here, but the necessity of their employment must always be kept in mind.

In the **local examination** an investigation is made of the genital tract and adjacent structures. The **steps** in the local examination and the order of their employment which the author finds most convenient when the patient can be placed on a table, are as follows:

Abdominal Examination.
Localization of Backache.
Inspection of External Genitals.
Vaginal Examination (Digital).
Vaginoabdominal Examination (Bimanual).
Instrumental Examination.
Rectoabdominal Examination.

EXCEPTIONALLY

X-ray Examinations.
    1. For patency of fallopian tubes.
    2. For fetal bone shadows.
    3. With pelvic pneumoperitoneum.
Investigation of Other Organs.
    1. Cystoscopic examination.
    2. Proctoscopic examination.
    3. Pelvic bone and joint investigation.
    4. Intestinal investigation.
    5. Neurologic investigation.
    6. Endocritic investigation.

7. Miscellaneous tests (Wassermann reaction. Tuberculin test).

Pelvic Examination under Anesthesia.

1. Bimanual palpation (vaginoabdominal and rectoabdominal).
2. Intrauterine exploration and curettage and excision of tissue from cervix.

When the patient is sick in bed at home, the order of examination is more frequently abdominal, back, vaginal, vaginoabdominal, and rectoabdominal. Inspection of the external genitals and the speculum examination are usually not required in such a case.

However, if there are symptoms pointing to disease of the external genitals, the parts should of course be inspected. Also, in any case, if it is thought that information of value may be obtained by the speculum examination, that procedure should be carried out.

ABDOMINAL EXAMINATION

Have the patient lie near the edge of the bed or table, in a comfortable position, with the head slightly raised on a pillow and the knees drawn up sufficiently to relax the abdominal muscles (Figs. 14, 15, 179).

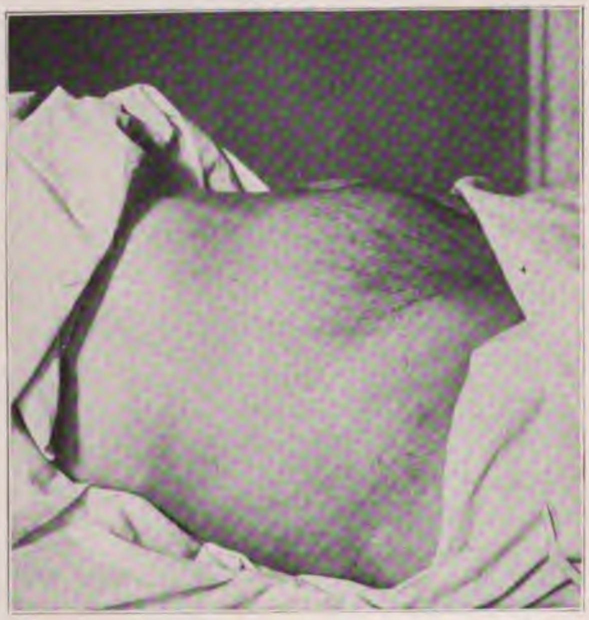


Fig. 14.—Patient on table and arranged for abdominal examination.

The abdomen is subjected to:

Inspection—Contour, Color, Eruption, Striae, Scars.

Palpation—Tension, Tenderness, Mass, Fluctuation, Fluid Wave, Fat Wave, Fetal Movement, Uterine Contraction, Friction Rub.

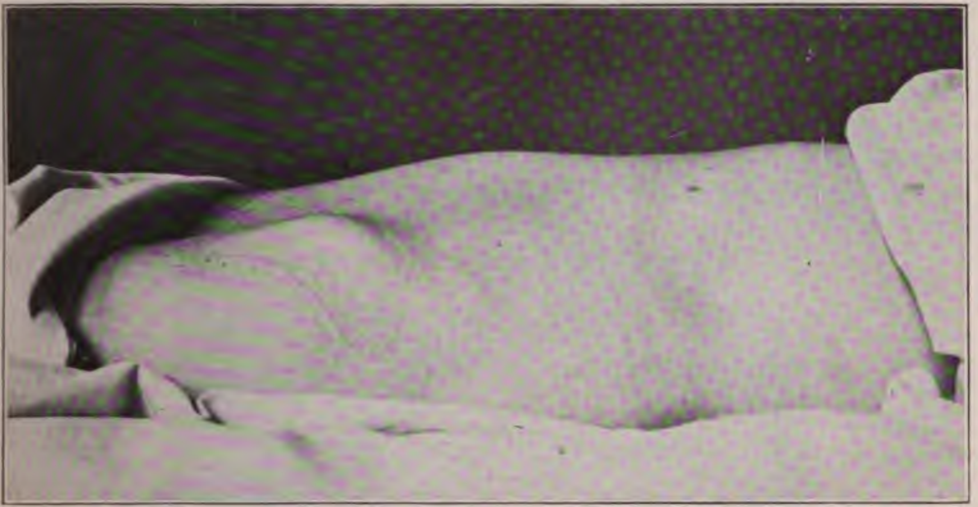


Fig. 15.—Profile of normal abdomen. Patient arranged for abdominal examination.

Percussion—Area of Dullness.
Auscultation—Fetal Heart Sounds, Vascular Murmur.
Menstruation—For accurate comparison.

INSPECTION OF ABDOMEN

Contour

ALSO, MOVEMENT, COLOR, ERUPTION, STRIAE, SCARS

The principal thing to determine by inspection is **contour.** Determine also the other items mentioned—movement of wall, color, eruption, striae, scars—but usually they are of secondary importance. As to contour, there may exist one of several conditions, as follows:

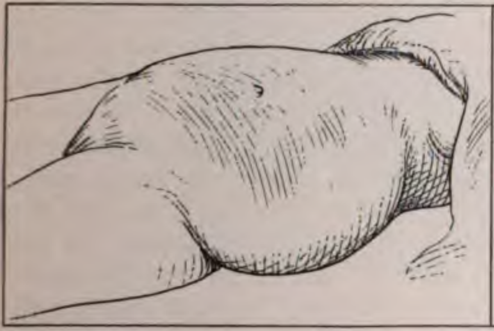


Fig. 16.—Contour of abdomen in moderate ascites.

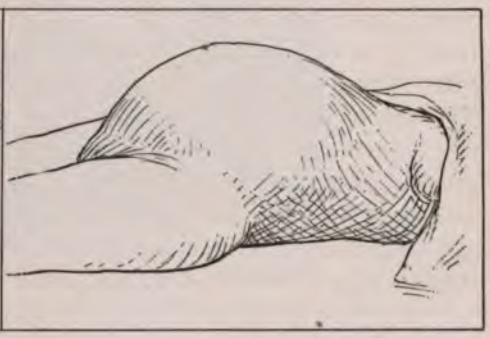


Fig. 17.—Contour of abdomen in marked ascites.

The smooth, moderately full contour of the normal abdomen (Figs. 14, 15, 20, 21).
The flat, sunken abdomen of wasting disease, with empty intestines.
A swollen, prominent abdomen (Figs. 16, 17, 18, 19).

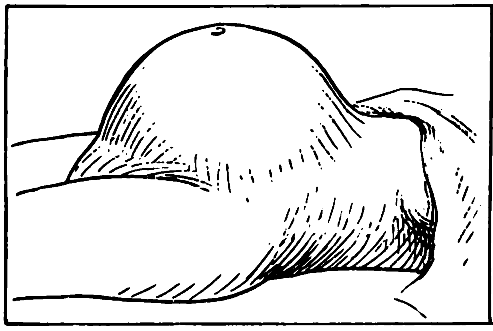


Fig. 18.—Contour of abdomen in cystic tumor.

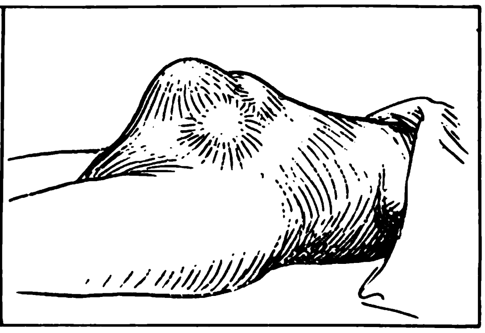


Fig. 19.—Contour of abdomen in solid tumor.

The significance of prominence of the abdomen is taken up in detail in the chapter on Diagnosis (Chapter II).

PALPATION OF ABDOMEN

Tension, Tenderness, Mass

Also, Fluctuation, Fluid Wave, Fat Wave, Fetal Movement, Uterine Contraction, Friction Rub

Tension and Tenderness

As to **tension,** we determine whether the wall is soft and easily depressed, or is firm and resisting from muscular tension. The latter condition may be due to nervousness or fright, the patient fearing that the examination will cause pain, or it may be due to genuine **tenderness** from inflammation or irritation beneath the wall, as in peritonitis or intraperitoneal hemorrhage.

The best way to begin palpation is to place the palmar surface of the **whole hand flat** on the abdominal wall (Fig. 22). Hold it there perfectly quiet for a moment, that the patient may see that you are not going to cause pain. Then, as the muscular tension relaxes, depress the wall carefully with the fingers (Fig. 23) in various directions and situations as the hand is moved about over the surface. Begin the movement of the hand gradually, almost imperceptibly at first, perhaps at the same time directing the patient's attention away by a question or two. When the patient's attention is fixed on the palpating hands, there is likely to be troublesome tension of the wall. As the examination proceeds, **deep** palpation is made in various parts of the abdomen in order to exclude disease in the various regions. Palpation with **both hands** (Fig. 24) assists much in determining the character and consistency of the tissues between them and under them, particularly when the abdomen is rather full. If a resisting area is found, work the fingers around it, depressing the wall and examining all portions of it (Fig. 25). The palpation should always be made **gently,** for, if the manipulations cause pain or frighten the patient, the wall is immediately made tense and then no satisfactory examination is possible.

In a case of suspected appendicitis or one sided inflammation, the difference in tension of the abdominal wall on the two sides is of diagnostic importance.

Having determined the general tension and tenderness, search is made for **local tenderness.** The exact location of the tenderness should be carefully determined, and also whether it is circumscribed to that area or extends to other areas. When the area of tenderness has been accurately located, we know what organs are likely to be affected, and the further differentiation between affections of those organs may be proceeded with.

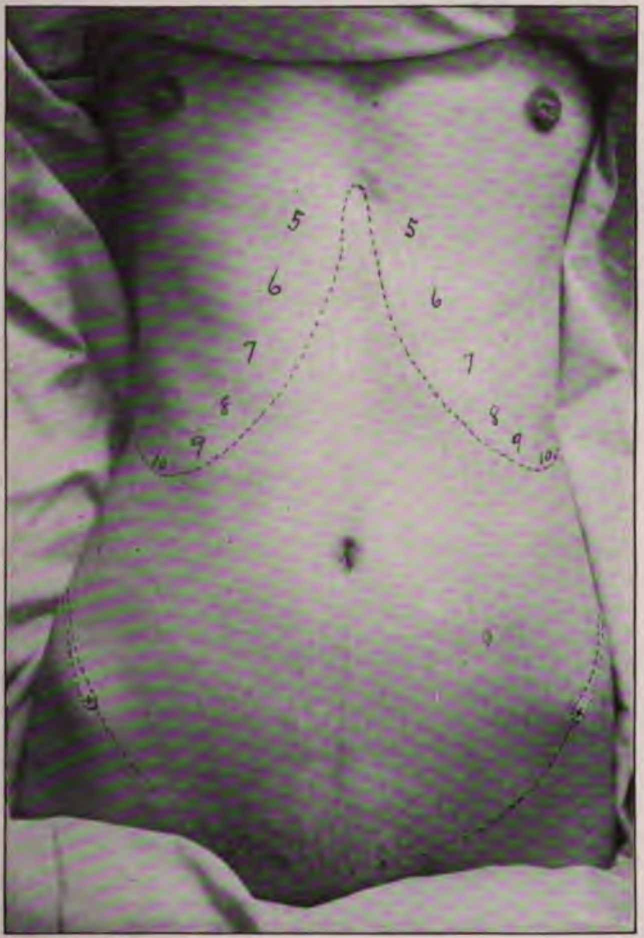


Fig. 20.—The abdominal surface with the rib margins and the iliac crests outlined.

Regions of the Abdomen.—For convenience in designating the location of tenderness or of a mass, the abdomen is divided into regions. There are several methods of division. A simple and useful one is the division of the surface into quadrants by an imaginary horizontal line passing through the umbilicus and a vertical line through the same point (Fig. 26).

This is very convenient for designating in a general way the location of large masses, but it is not sufficiently definite for the accurate localization of small masses or points of tenderness.

For the more definite localization, the time-honored division into squares, by two vertical and two horizontal lines (Fig. 27), is the one generally followed in anatomic and diagnostic works. However, as a practical working division for diagnostic and teaching purposes, this has been found decidedly inconvenient and unsatisfactory, as is attested by the many attempts of clinicians to devise a simple method of dividing the surface and of designating the various regions.

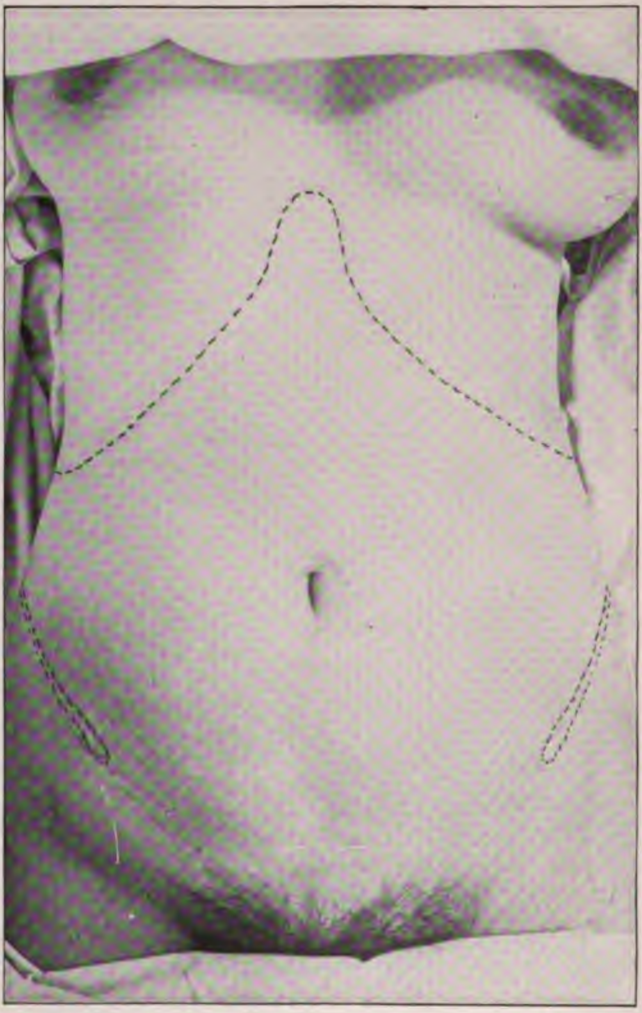


Fig. 21.—Another abdominal surface, with the ribs and crests outlined. This patient is rather stout. Notice how much the landmarks differ from those in Fig. 20.

Failing to find a method of division that was satisfactory to the author, he devised that shown in Fig. 28, which, so far as he knows, is original. The only lines not marked by natural landmarks are a circle with a two-inch radius about the umbilicus and a short straight line extending horizontally for two inches from each side of the circle.

The **regions** are designated as right lower, left lower, central lower, right upper, left upper, central upper, umbilical, and right and left lumbar (Fig. 29). This method of division is simple, and the names are easily remembered and are self-explanatory. In fact, these designations are the ones commonly used in conversation among physicians in describing the location of a mass or area of tenderness. For example, we speak of tenderness in the right lower region of the abdomen, or, more briefly, in the "right lower abdomen," or in the "left lower abdomen," or in the "right upper abdomen," etc.

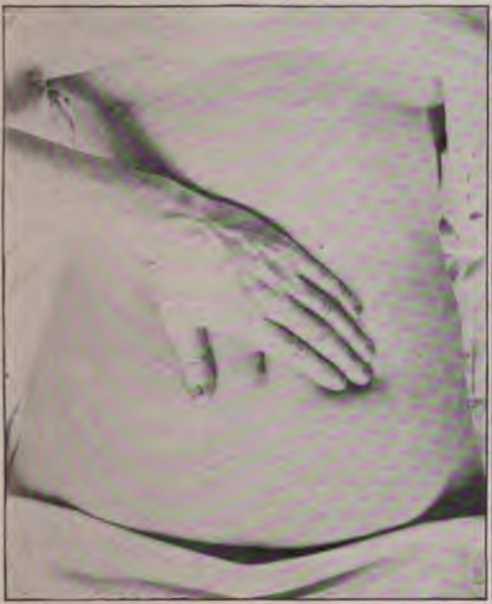


Fig. 22.—Palpation of the abdomen. First step. Hand flat on abdominal surface.

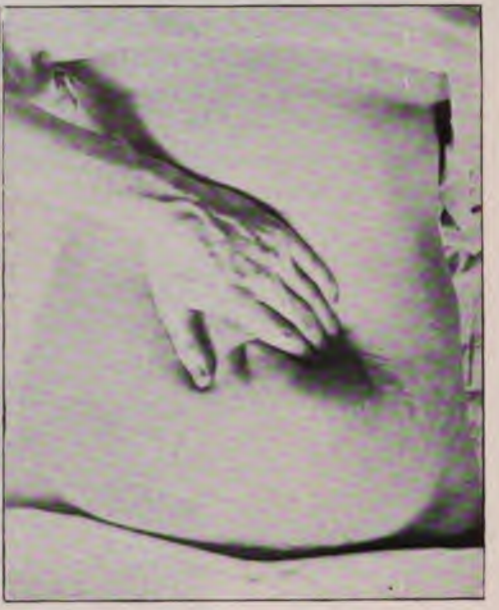


Fig. 23.—Palpation. Depressing the wall with the fingers of one hand, in various situations.

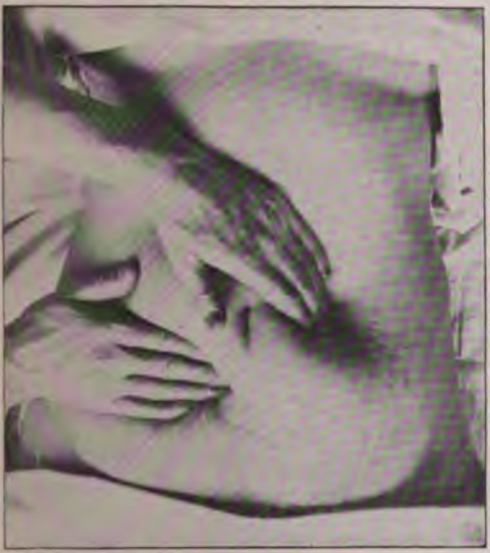


Fig. 24.—Palpation with both hands.

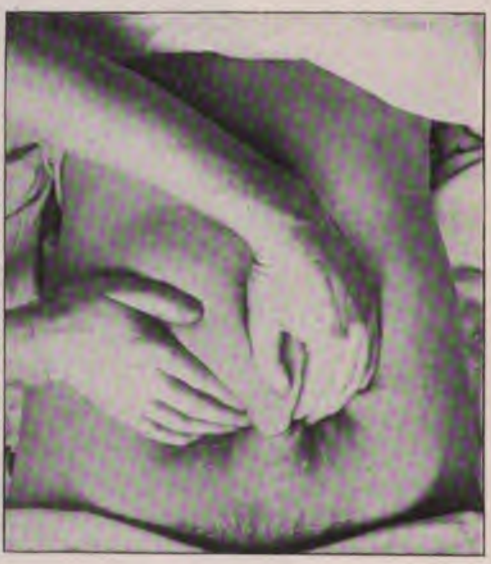


Fig. 25.—Deep Palpation with both hands.

Within each of these principal regions there are one or more points which are of special interest. The special interest attaches to each one of these points because well-defined tenderness limited to such point usually means an affection of a particular organ. It must be kept in mind, however, that in some cases such point-tenderness is due to an affection of some adjacent organ (as when inflammation within the cecum causes tenderness in the appendix region), or even of some distant organ which has become displaced (as when the right kidney has become displaced into the appendix region).

Again, in some cases tenderness is due to an organic or functional disturbance of the nerves of the abdominal wall or to reflected pain, due to a lesion in some other part of the abdominal cavity or to some organic or functional lesion in a distant part of the body. But even in these exceptional conditions the tenderness is usually not genuine "point-tenderness," but is more extensive and can be traced in some direction sufficiently far to indicate its probable origin.

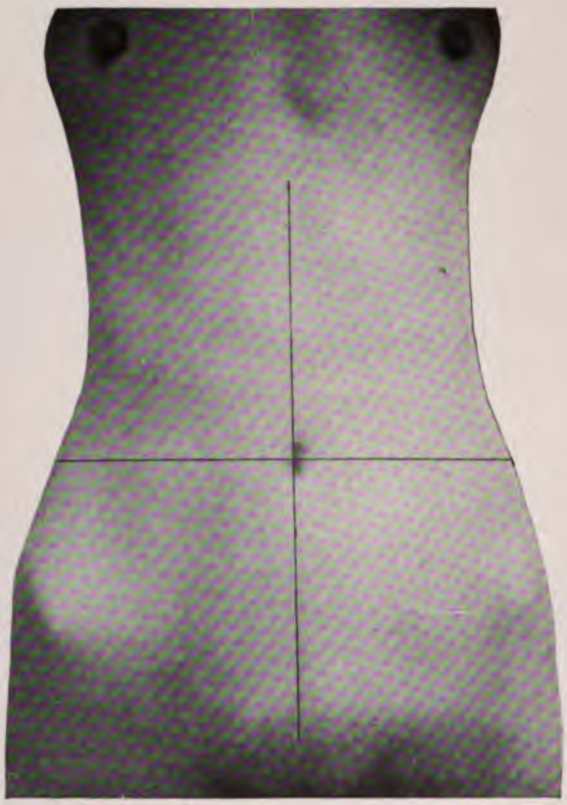


Fig. 26.—The abdominal surface divided into quadrants.

With the exceptions above mentioned kept in mind, the special areas of "point-tenderness" are of great help in the differential diagnosis of abdominal lesions.

The author does not approve of the method of naming the principal, or

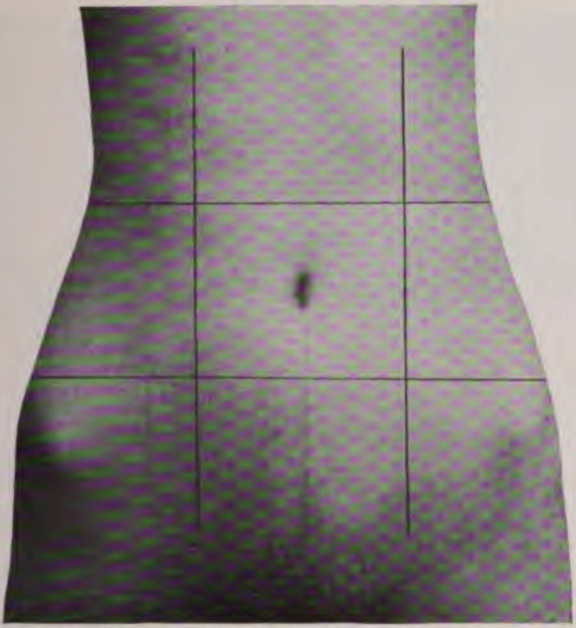


Fig. 27.—The usual anatomic division of the abdomen into nine regions by two transverse lines and two vertical lines. The upper transverse line is at the level of the cartilages of the ninth ribs, and the lower with the highest points of the iliac crests. The two parallel vertical lines pass through the cartilages of the eighth ribs and the middle of Poupart's ligaments.

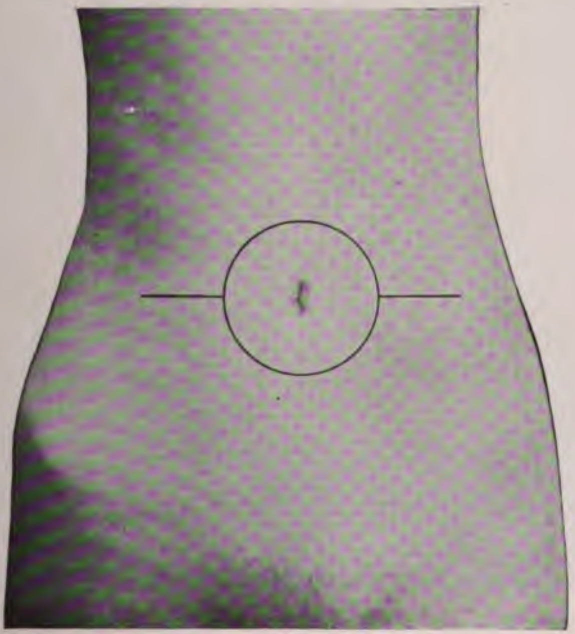


Fig. 28.—Division of the abdomen into regions by means of a circle with a two-inch radius and two-inch horizontal lines.

primary, regions of the abdomen from the significant point-tenderness situated therein. For example, to designate the right lower abdomen as the "appendiceal region," as is done by some authorities, leads only to confusion. It is no more the appendiceal region than it is the cecal region, or the tubo-ovarian region, or the ureteral region. The term "appendiceal region" should be reserved for the very circumscribed area immediately over the appendix, the same as the terms "tubo-ovarian region" and "ureteral region" should be limited to the areas containing those structures. Then when we speak of tenderness in the appendiceal region, there is no question as to the exact location of the tenderness.

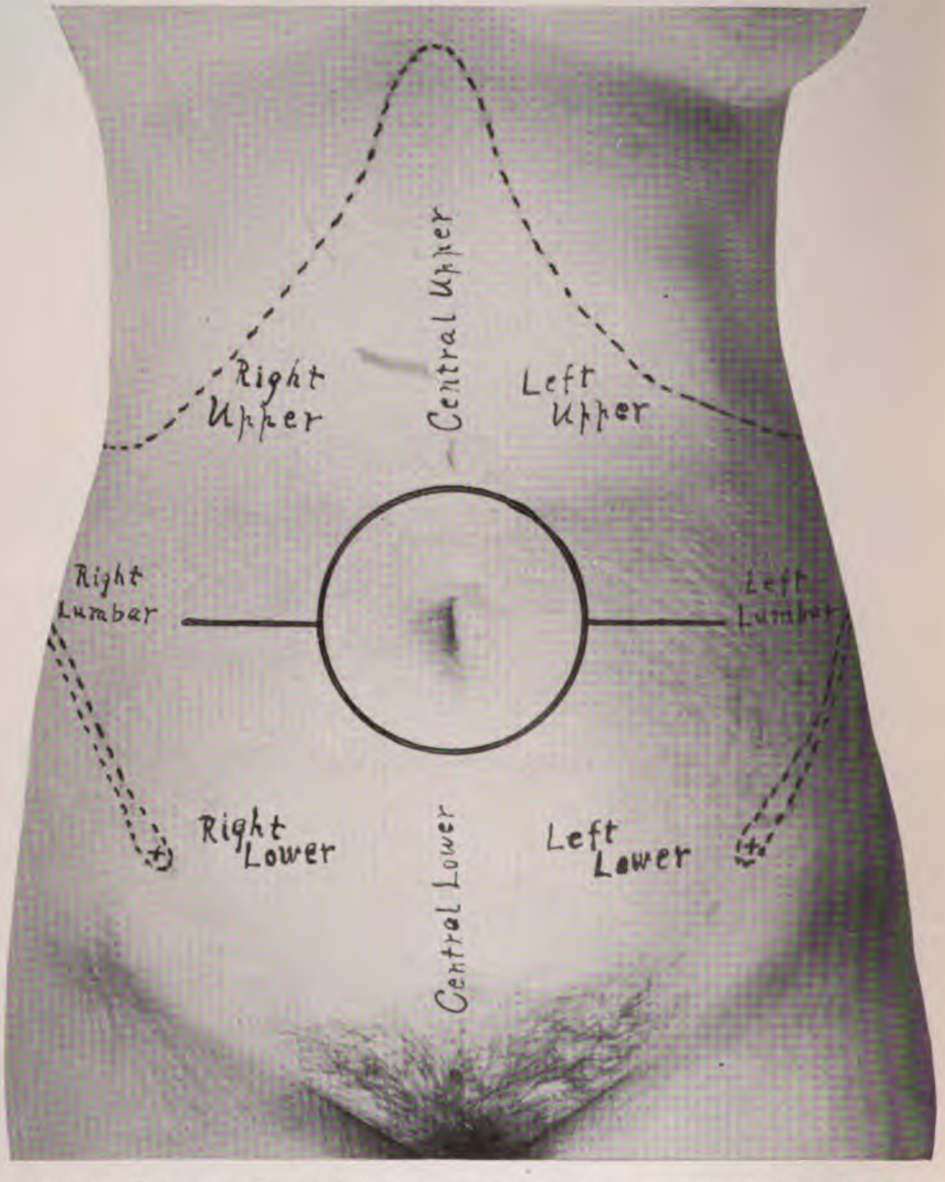


Fig. 29.—Another abdomen divided with the circle and short horizontal lines, and showing the names on the primary regions. The area within the circle carries the usual designation, "umbilical region."

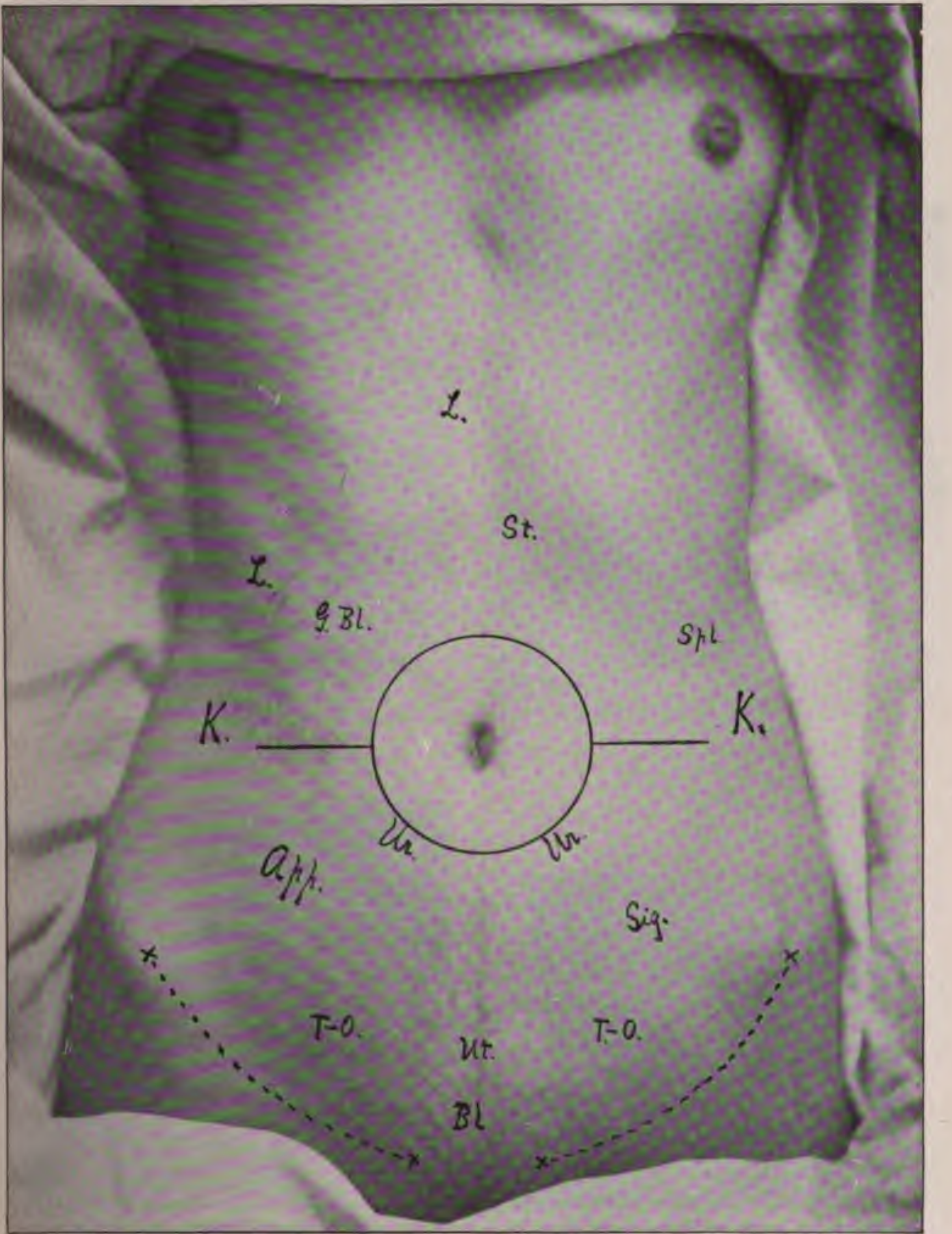


Fig. 30.—Various areas of significant point-tenderness. These are the areas to be investigated during the course of an abdominal examination.

The principal **areas of significant point-tenderness** are shown in Fig. 30. There are, of course, also many areas of secondary importance—of secondary importance because tenderness or a mass therein is not of such definite significance in diagnosis.

After locating accurately the point of greatest tenderness, try to **trace the**

tenderness in various directions. This is especially useful in cases which are doubtful because the tenderness is not typically situated or is not well limited.

For example, take a case in which the most marked point-tenderness is situated about midway between the right tube, the appendix and the ureter. It may be due, among other things, to disease of the tube or ovary, or of the appendix or cecum, or of the ureter, or of the small intestine, or of the peritoneum. Determine if well-marked tenderness can be traced down toward Poupart's ligament and the tube. If the tenderness does not extend in that direction, it is probably not due to trouble about the tube or ovary. Then try to trace it to the ureter and along the ureter downward toward the bladder and

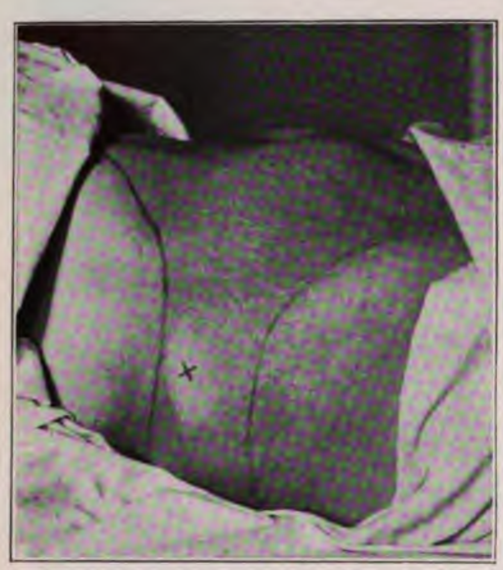


Fig. 31.—Point for kidney tenderness laterally.

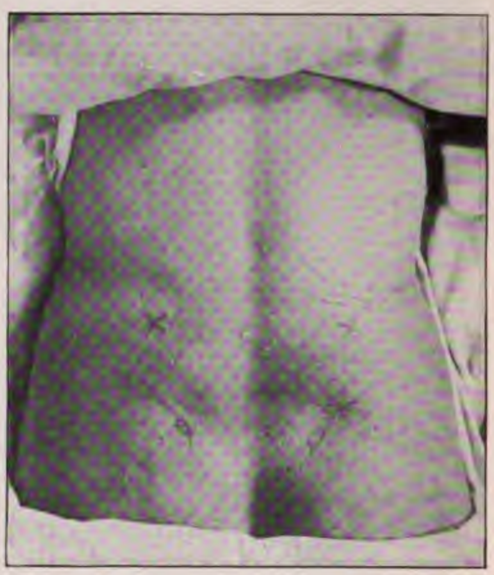


Fig. 32.—Points for kidney tenderness in the back.

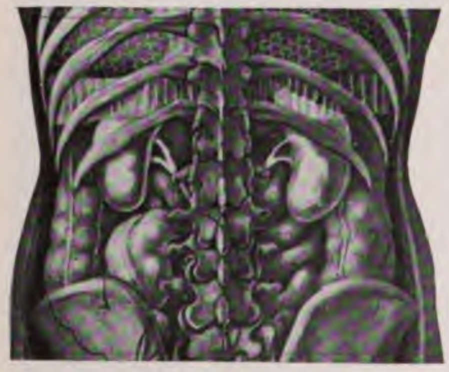


Fig. 33.—Relation of the kidney to the lower margin of the last rib. (Butler—*Diagnostics of Internal Medicine.*)

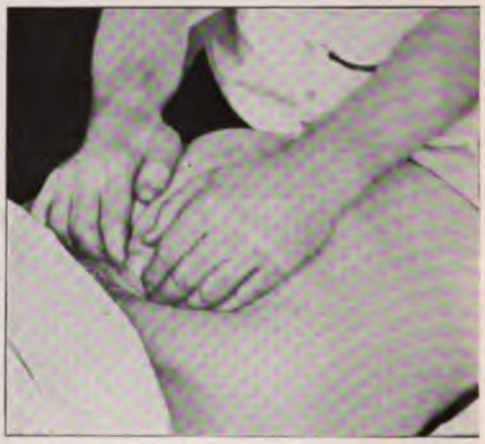


Fig. 34.—Attempting to displace a mass upward in order to determine if it has a pelvic attachment.

upward toward the kidney. Determine also if it spreads over the cecum and extends up along the ascending colon, as it is likely to do when caused by inflammation of the large bowel. Determine if it extends through the abdomen generally, including the umbilical region and beyond.

If it does not extend in any one of the directions mentioned, but is strictly limited to the point designated, it is probably due to appendix trouble, which probable diagnosis must be strengthened or weakened, as the case may be, by other signs present and by the history of the trouble.

In those cases in which there is a question as to whether or not the tenderness is due to trouble in the ureter, particularly where the tenderness extends over the whole right lower or left lower abdomen, or is so acute as to prevent the deep palpation necessary to accurate localization, palpation of the lumbar region laterally and posteriorly is of much assistance in the differential diagnosis. Well marked ureteritis is usually accompanied by pyelitis and kidney tenderness. In such a case there is distinct tenderness over the kidney laterally (Fig. 31) and also posteriorly (Figs. 32, 33).

Mass in the Abdomen

When a mass is discovered, determine as far as possible its position, size, shape, consistency, tenderness, mobility and attachments.

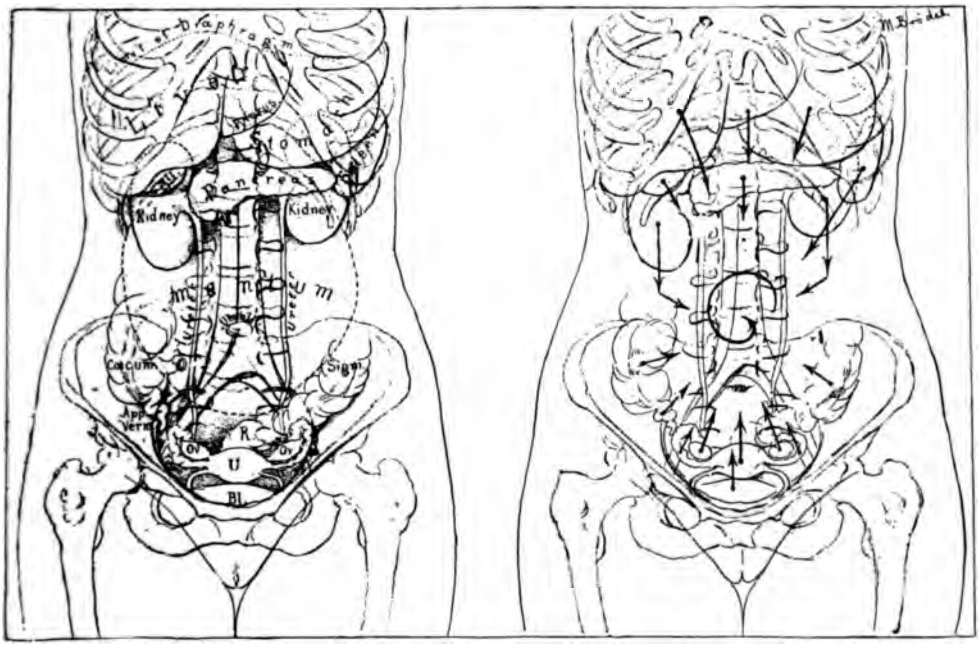


Fig. 35.—Showing the direction of growth of tumors of various abdominal and pelvic organs. In practically all cases, the direction of enlargement is toward the umbilical region. (Kelly—*Operative Gynecology.*)

The **position of a mass** indicates in a general way the organ or group of organs from which it arises. Keep in mind, however, that it may be due to some adjacent organ, or even some distant organ displaced into that region.

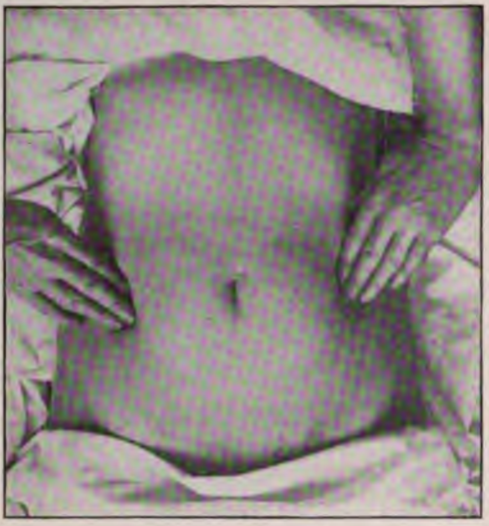


Fig. 36.—Testing the thickness of the abdominal wall. First step.

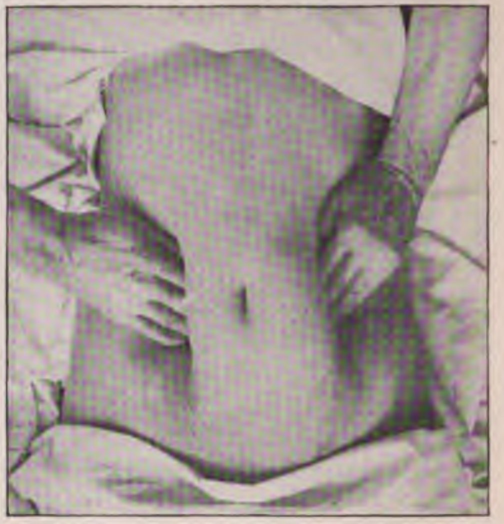


Fig. 37.—Testing the thickness of the abdominal wall. Second step. The fingers carried beneath the wall.

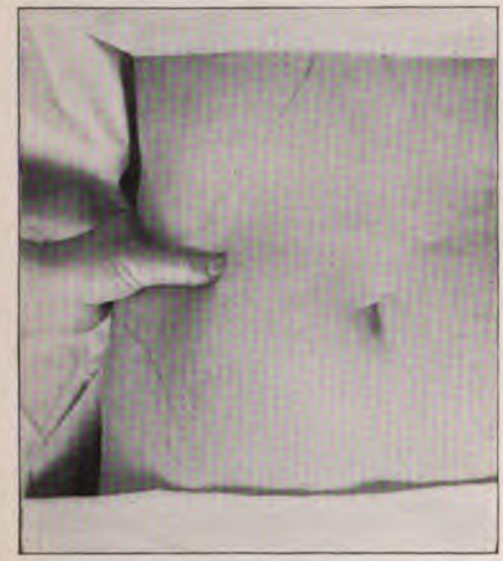


Fig. 38.—Palpation of a Movable Kidney, with the patient on her back. First step. The loin is grasped as here shown, to prevent the displaced kidney from slipping unnoticed back into its place at the beginning of palpation.

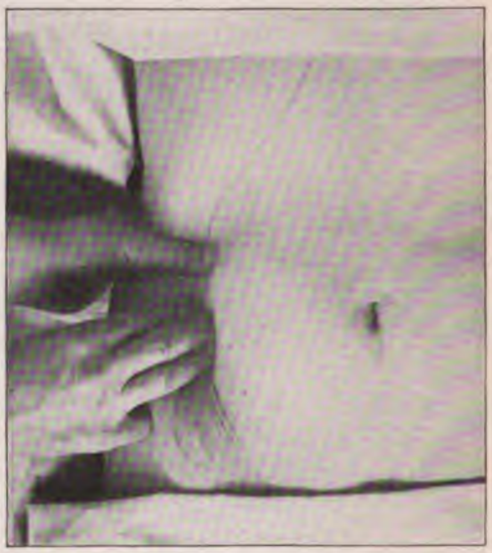


Fig. 39.—Palpation of a Movable Kidney, with patient on her back. Second step. Palpating the kidney with the right hand, while it is held in displacement with the left hand.

The **size and shape of a mass** is determined by ascertaining its length, breadth, thickness, and general contour. The length or height of a tumor projecting up from the pelvis is usually designated as so many inches or centimeters above the pubic symphysis, or below the umbilicus or above the umbilicus. The breadth may be given approximately in inches or centimeters, stating at the same time whether or not the mass is situated symmetrically on either side of the median line, or the mass may be referred to as filling the pelvis from side to side or as filling the abdomen. It is sometimes difficult to convey a satisfactory idea of the general contour of a mass by a detailed description, when it may be very quickly conveyed by referring to some well-known object, e. g., an egg, a lemon, a kidney, or an hour-glass.

Another method of recording the size and shape of a mass is to draw it within a stamped outline of the pelvis and abdomen. Still another expedient, devised by H. A. Kelly (Medical Gynecology, Chapter I), is to outline the mass and the landmarks in the individual patient on a large piece of gauze or muslin applied over the abdomen, the same being preserved as part of the case record.

The **consistency of a mass** should be carefully determined. Is it uniformly solid or does it present hard nodules, or does it contain fluid? If the mass contains a collection of fluid of sufficient size, there may be elicited that peculiar sensation known as **fluctuation**, the recognition of which is one of the first lessons in surgical work.

The **tenderness of a mass** as determined by palpation is of much importance in differential diagnosis. In acute inflammation (as in acute salpingitis or peritonitis), or in acute irritation (as in hemorrhage from tubal pregnancy), the tenderness is very marked. On the other hand, in uncomplicated ovarian or uterine tumors, tenderness is slight.

The **mobility** and **attachments of a mass** are determined by attempting to move the mass in different directions. The fingers are worked in deeply about the mass at various points, and it is determined just what part may be easily displaced and what part is fixed (Fig. 34). The fixed point of a mass usually indicates its point of origin, i.e., the organ involved, while the free border indicates the direction of growth, and hence is opposite to the point of origin. Fig. 35 shows the direction of growth of various abdominal tumors, and indicates in a general way where the fixed portion and the free border of each would be.

The presence or absence of mobility helps to determine, also, whether or not the mass is bound down by inflammatory exudate or is retroperitoneal or is in the abdominal wall. It is difficult at times to estimate how much of an abdominal enlargement is due to fat in the wall. The maneuver shown in Figs. 36 and 37 is very helpful in determining the **thickness of the abdominal wall.**

Retroperitoneal masses are usually fixed, but certain of them are quite movable. This is seen especially in kidney tumors and even in kidneys without tumors. In any mass near the lumbar region a displaced kidney must be considered. Figs. 38 and 39 show a useful method of palpating for movable kidney. Occasionally an intraperitoneal mass without adhesions is not movable because it is so large that it fills the cavity.

Fluid Wave, Fat Wave, Fetal Movement, Uterine Contraction, Friction Rub

If there is a large collection of fluid, as in a case of marked ascites, a **fluid wave,** started by tapping on one side of the abdomen, may be felt by the other hand applied to the other side (Fig. 40). A somewhat similar wave may be caused, also, by a thick layer of subcutaneous fat (fat wave). In such a case, however, if an assistant press lightly in the median line with the ulnar edge of the hand, the **fat wave** will stop at the line of pressure (Fig. 41).

A distinct fluid wave may be obtained in any large collection of fluid with a comparatively thin wall. It is present in well-marked ascites, in unilocular cysts and in multilocular cysts with one or more large cavities. Occasionally the fact that there are different large cavities in the cyst may be surmised by a distinct difference in the fluid wave as obtained through different parts of the cyst. In a cyst with small cavities no fluid wave is obtained, as there is not a large enough single cavity, although fluctuation may be as clear as in a single large cyst. Also, in a cyst with thick gelatinous contents a fluid wave may not be obtained.

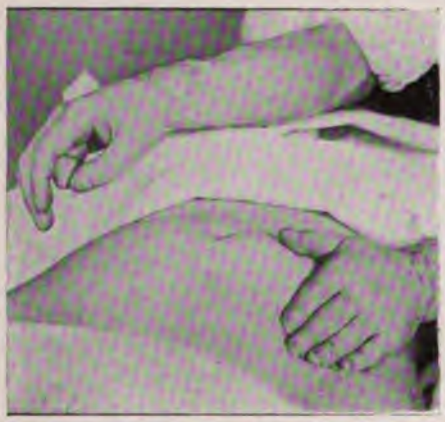


Fig. 40.—Trying for a fluid wave across the abdomen.

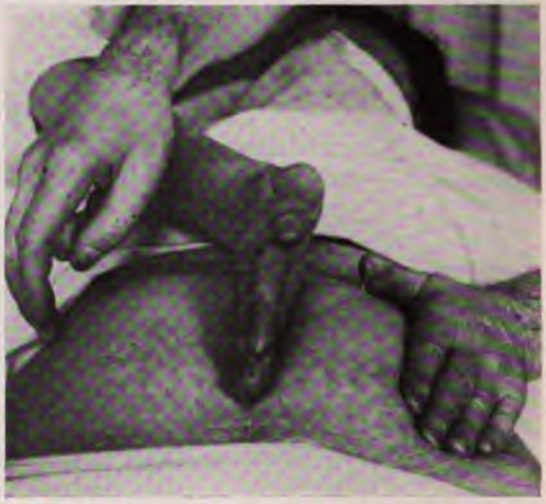


Fig. 41.—Differentiating a fat wave from a fluid wave. The fat wave is stopped by the pressure in the median line.

In late pregnancy, **fetal movement,** caused by the fetus changing position or kicking, may not infrequently be felt. Dipping the hands in cold water and then laying them flat over the uterus may cause the fetus to move.

The absence of fetal movements is of no diagnostic significance, but the presence of them is of course certain evidence of existing pregnancy and consequently well worth trying for in a doubtful case.

The same may be said of the **intermittent contraction** and relaxation of the pregnant uterus. In some cases alternate hardening and softening of the uterus may be very distinct, and when felt is positive evidence of the character of the mass under the hands.

A **friction rub** may sometimes be felt in a case of active peritonitis, particularly in the local plastic or irritative peritonitis that not infrequently takes place when a tumor lies against the abdominal wall. The hand is pressed over the mass during forced respiration. Occasionally the friction rub may be obtained over the liver or spleen when there is a local peritonitis there.

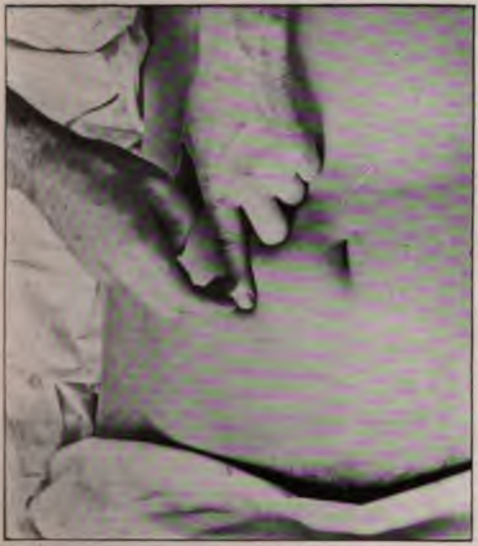


Fig. 42.—Ordinary percussion, which is usually rather superficial.

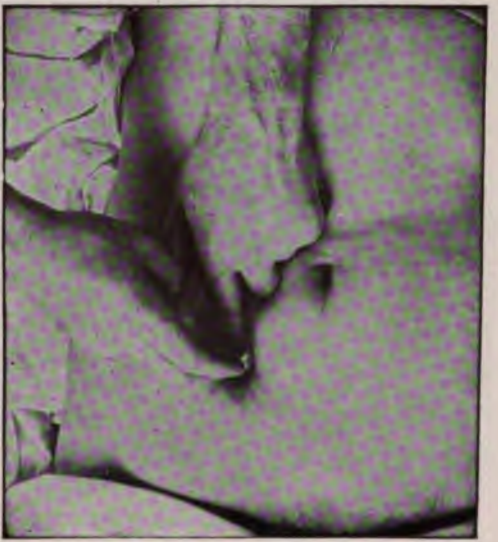


Fig. 43.—Deep percussion. Notice how the left index finger is pressed into the abdomen, so as to thin out the wall and compress the intestine and get close to deep structures.

PERCUSSION OF ABDOMEN

Area of Dullness

Percussion over the abdomen serves to confirm the information obtained by palpation, and also brings out some new facts—for example, by outlining accurately the **area of dullness** it shows at what portion of the abdominal wall the tumor or fluid lies against the wall, and at what portion there is intervening intestine. It shows also whether the mass or fluid changes relations when the patient changes position. In a ventral hernia (intestinal) it shows that

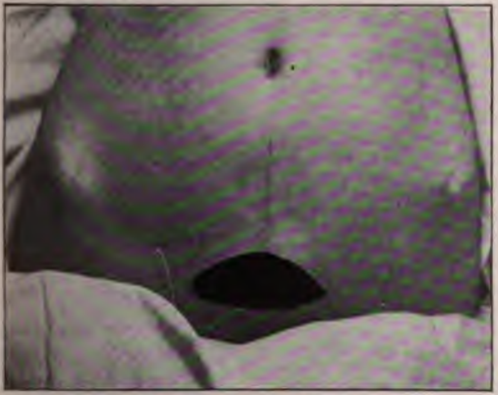


Fig. 44.—Indicating area of dullness due to distention of the bladder.

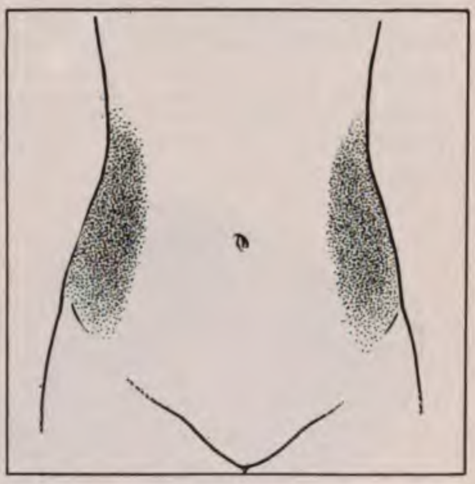


Fig. 45.—Indicating location of dullness in moderate asites.

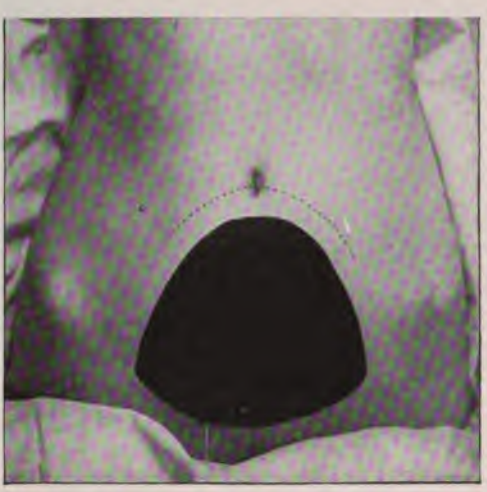


Fig. 46.—Indicating area of dullness from a large mass of regular outline rising out of pelvis, for example, the pregnant uterus. The dotted outline shows the upper limit of mass, obtained by palpation.

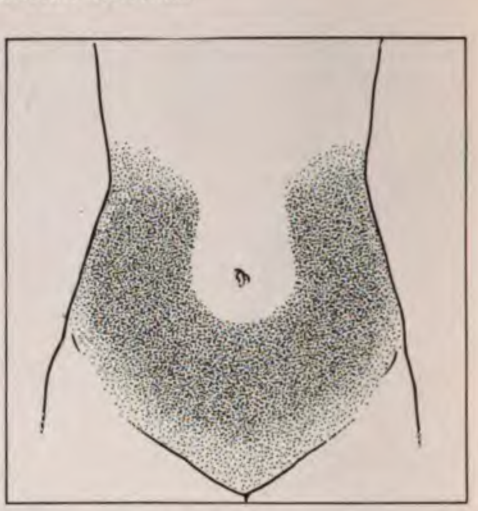


Fig. 47.—Indicating area of dullness in marked ascites with patient recumbent.

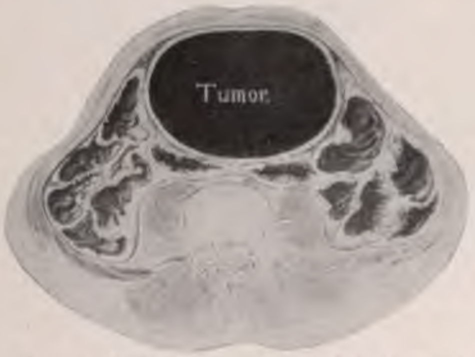


Fig. 48.—Indicating the relation of the dull and resonant areas in the case of a Tumor occupying the central lower abdomen. (Butler—*Diagnostics of Internal Medicine.*)

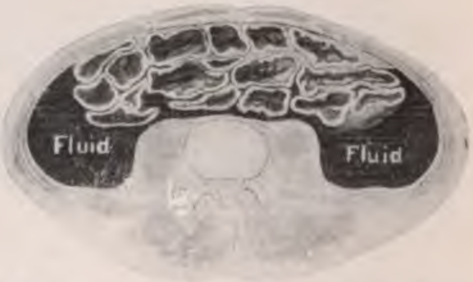


Fig. 49.—Showing the reason for the disposition of the dull and resonant areas in a case of moderate ascites. (Butler—*Diagnostics of Internal Medicine.*)

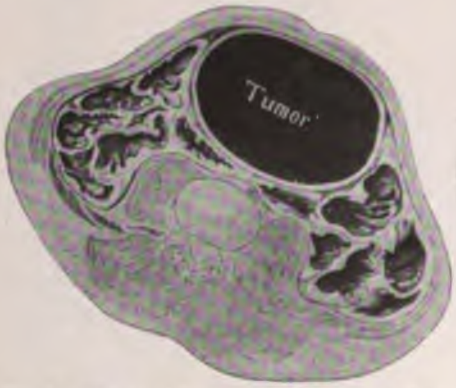


Fig. 50.—Tumor. Representing patient turned on side. No change in area of dullness. Compare with Fig. 51.

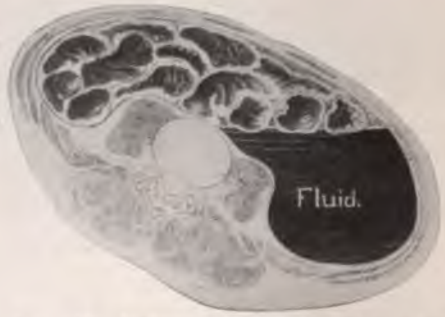


Fig. 51.—Ascites. Representing the patient turned on one side. The fluid gravitates to the under side, leaving the upper flank resonant. (Butler—*Diagnostics of Internal Medicine.*)

the large mass, which might be taken for a tumor or inflammatory mass, is resonant—i.e., it contains air, and, therefore, must under ordinary circumstances, contain intestine. Endeavor to get definitely in mind exactly the reason for the dullness or resonance found in a particular case, and then its diagnostic significance will be clear.

The area of dullness from a moderately distended bladder is indicated in Fig. 44, and that from a six months' pregnancy in Fig. 46. The area of dullness for moderate ascites is indicated in Fig. 45, and for marked ascites in Fig. 47. The stationary character of the outline of the dullness in tumors, on changing position of patient, and the shifting dullness in ascites are indicated and contrasted in Figs. 48, 49, 50, and 51.

The use of **superficial** and **deep** percussion in succession may give valuable information in some cases. Ordinary percussion (Fig. 42) is moderately light and superficial, and gives resonance over all the normal abdomen, except where the liver lies against the wall. In marked obesity, however, superficial percussion is likely to give only dullness over all the abdomen, while deep percussion (a hard percussion stroke against the finger pressed in deeply —Fig. 43) gives resonance.

A tumor of the wall or of the omentum ordinarily gives dullness in light percussion and resonance in deep percussion.

AUSCULTATION

Fetal Heart Sounds, Vascular Murmur

Auscultation, either by the ear direct (a sheet intervening) or by the stethoscope, should always be employed when there could be any confusion with advanced **pregnancy,** as in a case of large ovarian tumor or large myoma. The fetal heart sounds are the only sounds pathognomonic of pregnancy. The placental murmur may be simulated by the large vessels of a tumor. The absence of fetal heart sounds does not exclude pregnancy, for even in cases of normal pregnancy they cannot always be heard. Auscultation should be employed also in obscure cases of pain in the abdomen, particularly if accompanied by pulsation. The pain may be due to an **aneurism** of the abdominal aorta, which occasionally runs its course unrecognized until rupture and sudden death. In auscultation for aneurismal murmur with a stethoscope, be careful that the abdominal wall is not pressed firmly against the aorta with the stethoscope, for such pressure will cause a murmur in a normal vessel.

Excessive gurgling in the intestines may be heard in most intestinal diseases accompanied with tympanites. It is heard particularly in the region of the ileocecal valve or about a partial obstruction or over a loop of bowel in peristaltic movement. Gurgling over a large mass indicates that one or more intestinal coils are between it and the abdominal wall. This intestine may be in front because the mass is retroperitoneal or because an intestinal coil is adherent over the mass, or because the mass is made up partly or wholly of adherent intestinal coils.

A friction sound may occasionally be heard in local peritonitis, particularly over the areas of fresh plastic peritonitis or over a tumor.

MENSURATION OF ABDOMEN

Measure the abdomen when it is very large or when there is a growing tumor, or when for other reason it may be desirable to know **exactly any difference** in size some weeks or months hence, or when it is desired to speak with accuracy concerning the size of the abdomen in the case of a large growth.

The measurements are made with the ordinary tape-line. When measuring a patient, take enough measurements to make an accurate record. Measurements along the lines shown in Fig. 52 will show variations with a large growth in any part of the peritoneal cavity. They are as follows:

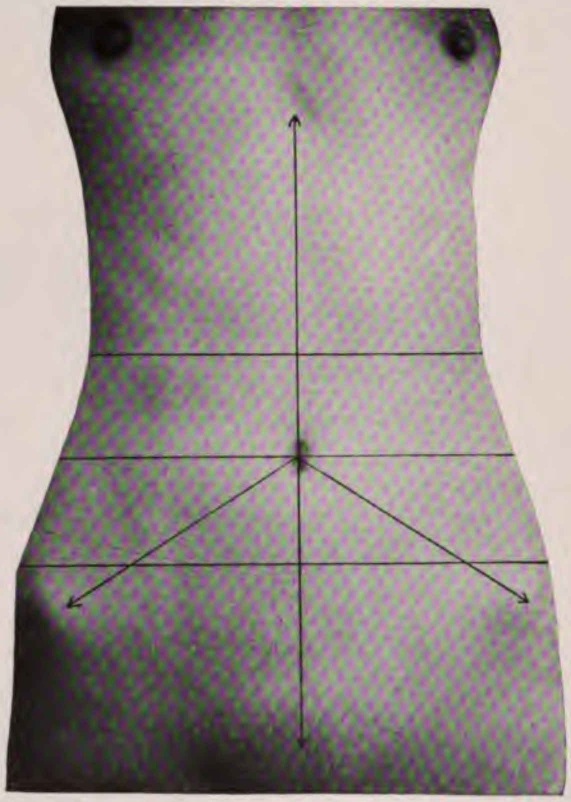


Fig. 52.—Showing lines for mensuration.

1. From umbilicus to sternal notch.
2. From umbilicus to pubes.
3. From umbilicus to right anterior superior iliac spine.
4. From umbilicus to left anterior superior iliac spine.
5. Circumference of body at level of umbilicus.
6. Circumference of body 3 inches above umbilicus.
7. Circumference of body 3 inches below umbilicus.

LOCALIZATION OF BACKACHE

Pain in the back is a prominent symptom in many pelvic diseases, and in many extrapelvic diseases as well. Its diagnostic significance depends on its location, that is, upon the structure involved. Consequently a careful localization of the backache should be made in each case, the same as pain or tenderness in the abdomen is accurately located. In this localization the hand is slipped under the lumbar region, as the patient lies on the back, and the different areas of the lumbar and sacral regions palpated systematically, the patient being questioned the while as to which region she **had the pain in** and whether or not there is any **tenderness on palpation.**

Notice first whether the backache is located in the lumbar region or in the sacral region. If in the **lumbar region,** ascertain whether it is in the spine (center) or in the thick muscle-group to either side or in the kidney region of one or both sides (Figs. 32 and 33). If in the **sacral region,** ascertain whether it is diffused across the sacrum (usual in extensive pelvic disease) or is localized in one or both sacroiliac joints (Fig. 32) or in the sacrococcygeal region.

The diagnostic significance of the various forms of backache and back-tenderness is further considered in Chapter II.

EXAMINATION OF EXTERNAL GENITALS AND ADJACENT STRUCTURES

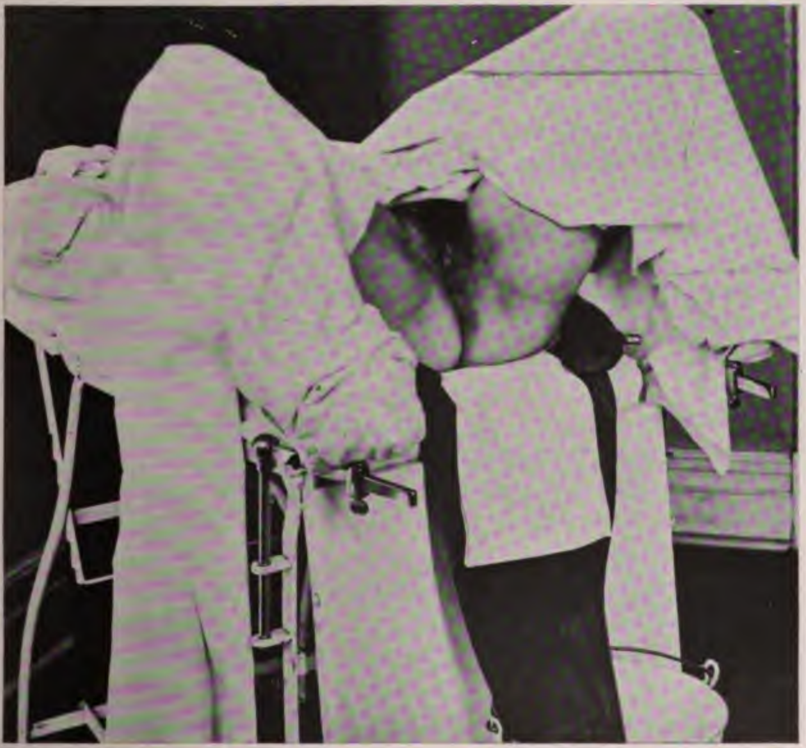


Fig. 53.—Patient in position for examination of external genitals and adjacent structures.

If the patient complains of irritation about the external genitals, or of itching or burning, or of frequent or painful urination, or of sores or swelling or discharge, the parts should be inspected in a good light. For this examination, as the patient is lying on the table, the lower extremities are covered with a sheet, the skirts are pushed above the knees and out of the way, and the hips are brought to the end of the table, as shown in Fig. 53.

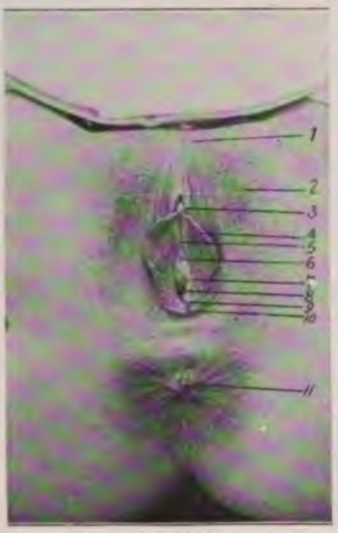


Fig. 54.—External genitals. *1.* Mons veneris. *2.* Left labium majus, drawn aside. *3.* Clitoris. *4.* Left labium minus, slightly larger than the average. *5.* Vestibule. *6.* Urethra. *7.* Duct of vulvovaginal gland. *8.* Vaginal entrance. *9.* Remains of hymen. *10.* Fourchette. *11.* Anus. (Byford—*Manual of Gynecology.*)

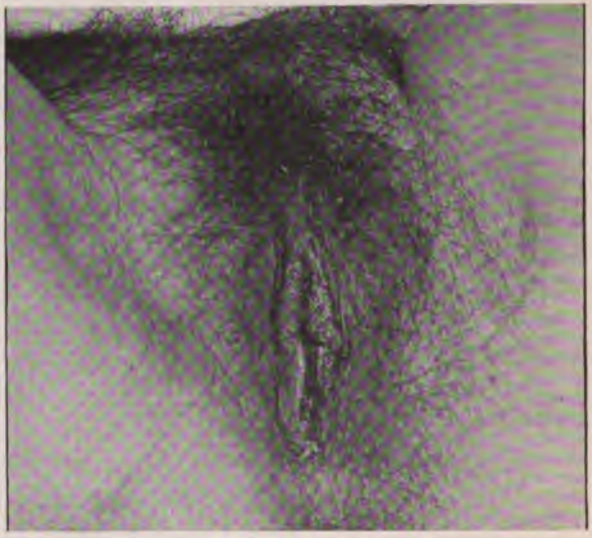


Fig. 55.—Practically Normal External Genitals—multipara, labia together. The corrugations of the labia minora are more marked than usual, but can hardly be called abnormal. The various details of the external genitals vary much within normal limits. The labia minora particularly vary greatly in size and contour and color in different individuals.

A general inspection is then given the parts, to ascertain if they are practically normal (Figs. 54, 55) or if there is marked abnormality. The labia are then separated, to expose the vestibule and urethral and vaginal openings, and also the openings of the ducts of the vulvovaginal glands.

By examination determine whether any of the following conditions are present:

Discharge—Mucoepithelial, Mucopurulent, Purulent, Bloody, Watery.
Inflammation—Gonorrheal or otherwise.
Ulcer—Simple, Chancroidal, Syphilitic, Tuberculous, Malignant.
Swelling—Inflammatory, Stasis Infiltration, Edema, Hematoma, Hernia, Cyst.
New Growth—Condyloma, Urethral Caruncle, Lipoma, Fibroma, Malignant Growth.
Malformation—Adhesions of Labia, Pseudohermaphroditism.

Determine also the

Condition of Hymen—Intact, Lacerated, Destroyed.
Condition of Perineum—Normal, Lacerated (wide opening, vaginal walls visible, shallow perineum, scar tissue, fistula).

DISCHARGE ABOUT EXTERNAL GENITALS

Mucoepithelial, Mucopurulent, Purulent, Bloody, Watery

Mucoepithelial Discharge (normal).—The normal mucous secretion from the cervix moistens and macerates the vaginal epithelium. The mixture of this cervical mucus and vaginal epithelium appears at the external genitals as a white, crumbly discharge. Usually it is hardly noticeable, only just enough to keep the parts normally moist. At the menstrual periods, and under other conditions favoring pelvic congestion, it may increase so as to be somewhat annoying to the patient, though hardly of pathologic importance.

Mucopurulent Discharge.—When there is inflammation or persistent congestion in the uterus, the mucous secretion is much increased, and there are thrown out, at the same time and for the same cause, many leucocytes, which mix with the mucus, giving it somewhat of a purulent character, the prominence of the purulent feature depending on the amount of this admixture of dead leucocytes. If it contains enough mucus to be noticeable, the discharge is sticky and stringy, and may be drawn out into long threads.

Purulent discharge presents the appearance of pus, as from an abscess or inflamed surface, either thin pus or thick yellow pus. Determine just where this comes from—i.e., whether from the urethra or vulvovaginal gland, or inflamed surfaces on the external genitals or from the vagina.

Dip the tip of a cotton-wrapped applicator in this purulent discharge and spread some on a microscopic slide.

If possible, secure some discharge from the urethra or vulvovaginal gland, for the pus from these situations is much more satisfactory for microscopic examination than the mixed vulvar or vaginal discharge.

To secure urethral pus, separate the labia, cleanse the meatus, and compress the internal end of the urethra by pressure against the anterior vaginal wall with the tip of the index finger. Then, still maintaining the pressure, draw the tip of the finger along the urethra toward the meatus (Fig. 56). This brings the urethral pus to the meatus (Fig. 57).

Chronic inflammation in the urethra is likely to be situated in Skene's glands, and in such a case some pus may be pressed from these small glands by compressing the urethra (by pressure through anterior vaginal wall) just back of the meatus. In some cases, particularly in a multipara, the urethral mucosa pouts out, so that by careful examination the orifice of one or both of Skene's glands may be seen. Fig. 58 shows such a gland-opening (left side) and also a drop of pus which has been pressed from the gland on the right side.

The vulvovaginal glands (Bartholin's gland—Fig. 59) are situated symmetrically on either side of the vaginal opening. The opening of the duct of the gland of each side is situated laterally, just in front of the remnants of the hymen and a little below the middle of the lateral margin of the vaginal opening. Draw aside the labia in this situation and look for the opening of the gland, and determine whether or not the opening is reddened and if there is any discharge from it (Fig. 60).

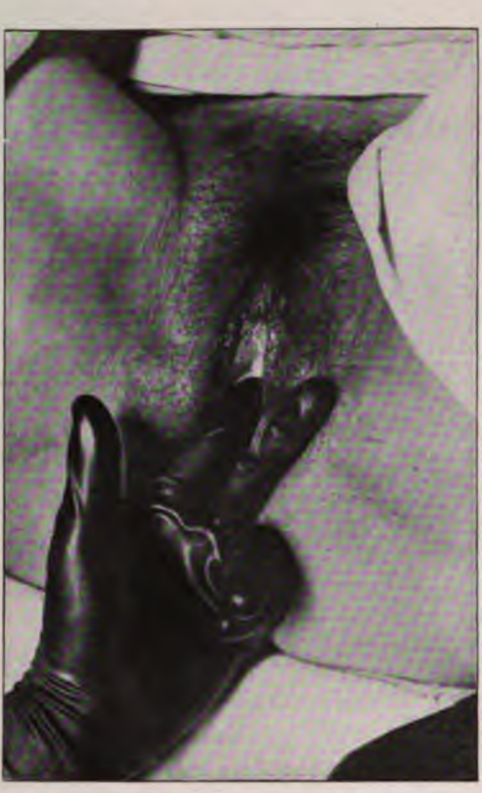


Fig. 56.—Method of pressing pus from the depth of the urethra to the meatus.

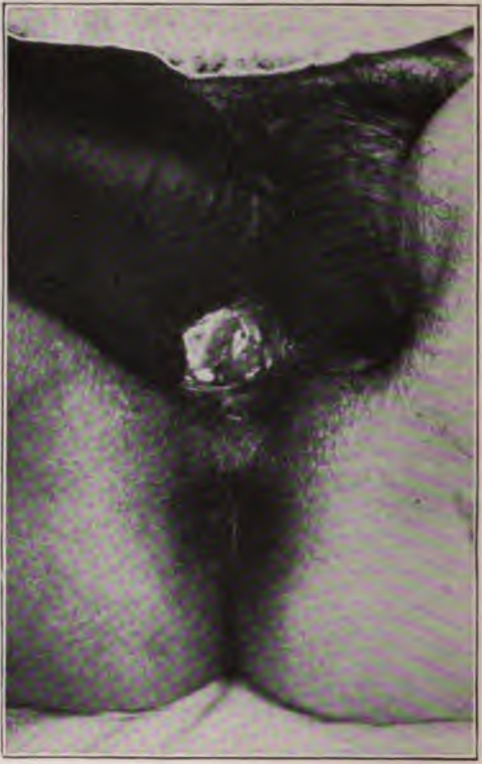


Fig. 57.—Appearance of pus at the urethral opening.

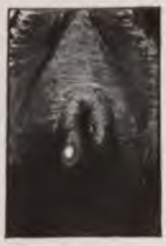


Fig. 58.—Slight eversion of urethral mucosa, so that openings of Skene's glands come into view. On left side the gland opening is seen. On right side a drop of pus has been squeezed from the gland and partially obscures the field. (Kelly—*Operative Gynecology.*)

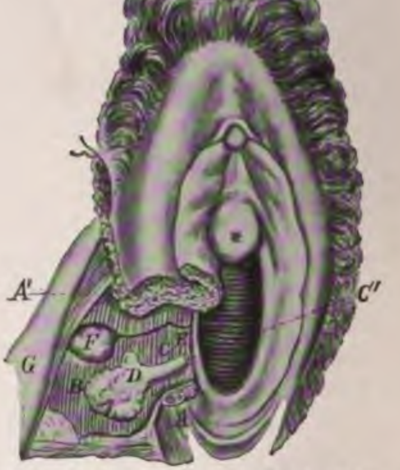


Fig. 59.—Vulvovaginal gland (*D*) and duct (*C*) of right side. (Byford, after Huguier—*Manual of Gynecology.*)

To examine either vulvovaginal gland, to determine if there is any thickening or tenderness from inflammation, or if pus can be squeezed from it, grasp the region of the gland between the index finger in the vagina and the thumb outside, as shown in Fig. 61.

When securing secretion for microscopic examination, it is well to take discharge from different localities, making the spread with the applicator-tip in the form of different letters for different regions—for example, U (urethra), V (vagina), C (cervix). If the specimens are to be sent to a laboratory, stick a small label to each slide, and write on it the date, the patient's initials, and the exact locality from which it was taken. In a doubtful case of urethritis, in which no secretion can be secured at the first examination, direct the patient to pass no urine for two or three hours before the next examination. Detailed directions for staining the gonococcus will be found under Gonorrhea in Chapter IV.

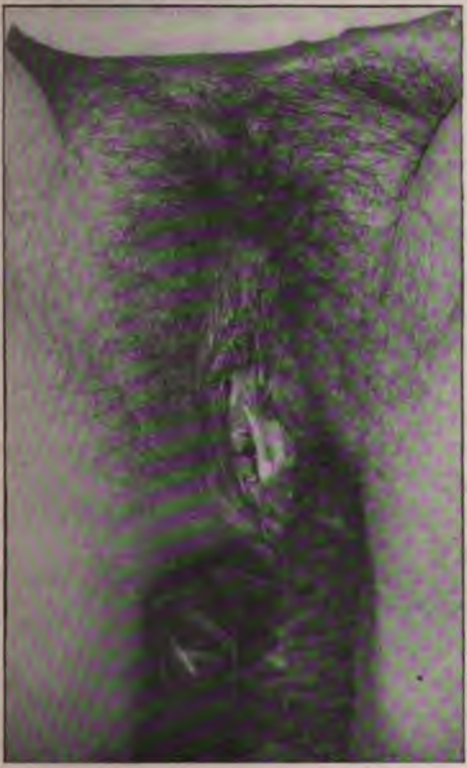


Fig. 60.—Appearance of pus about the opening of the left vulvovaginal gland.

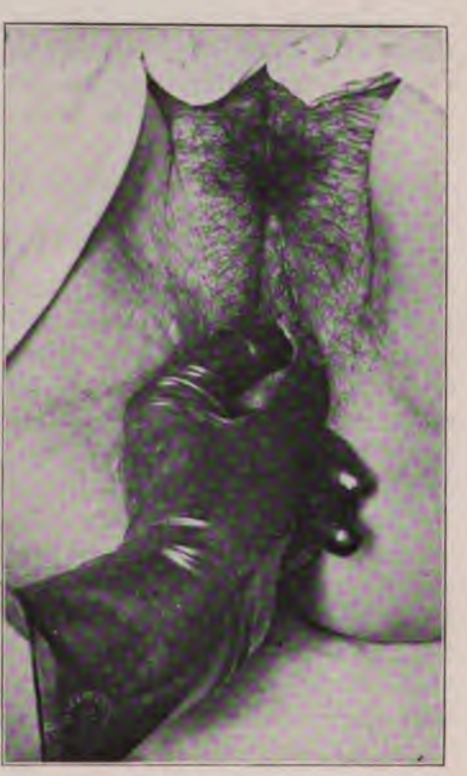


Fig. 61.—Palpating the left vulvovaginal gland, to determine if there is thickening or tenderness, or if pus can be pressed from it.

Bloody Discharge.—The discharge is red or brown, the intensity of the color depending, of course, upon the amount of blood. It varies all the way from a slight reddish or brownish tinge, hardly noticeable, to practically pure blood or clots. The blood may be mixed with any of the other pathologic discharges—mucopurulent, purulent or watery. The causes of blood in the vaginal discharge are enumerated in Chapter II.

Watery Discharge.—A portion of the discharge appears like water. This may be associated with the normal mucoepithelial discharge or with a mucopurulent or purulent discharge. The most common cause of a watery discharge is the decomposition of a malignant tumor-mass in the vagina or uterus, giving the characteristic watery, foul-smelling discharge of advanced cancer or sloughing myoma.

INFLAMMATION ABOUT EXTERNAL GENITALS

Gonorrheal or Otherwise

Inflammation is indicated by redness and tenderness, either diffused or in spots. It is usually accompanied by smarting or burning on urination. The smarting on urination and the increased frequency of urination are most marked when the urethra is involved.

ULCER ABOUT EXTERNAL GENITALS

Simple, Chancroidal, Syphilitic, Tuberculous, Malignant

If an ulcer is found, determine its position, size, shape, consistency (edge and underlying tissues), tenderness and mobility (whether fixed to underlying deep structures or freely movable). Determine also the character of the discharge from it, and whether it bleeds readily on touching. Notice whether the base is made of regular granulation tissue or has yellow dots scattered in it, or is filled with a slough. Examine also the edges—do they slope from within outward, as in an ordinary ulcer when healing, or are they sharp-cut and perpendicular, or undermined as in a rapidly spreading chancroid? Is there a red acute-inflammatory zone about the ulcer or is there a wide area of chronic infiltration (chronic inflammation, malignancy)? Is there only a single sore or are there several? Are the inguinal glands affected? If so, in what way? Is there any other condition indicating the cause and character of the ulcer? For the **differential diagnosis** of the various kinds of ulcer see the consideration of ulcers in Chapters II and IV.

SWELLING ABOUT EXTERNAL GENITALS

Inflammation, Stasis Infiltration, Edema, Hematoma, Hernia, Cyst

Swelling may be **inflammatory** (as in acute edema or abscess), or **obstructive** (as in edema from obstruction by heart or liver disease or from tumor in abdomen or pelvis). There may be obstructive edema and infiltration from scar-tissue about the pubic arch (stasis hypertrophy), or edema and infiltration from obstruction of vessels by filaria (elephantiasis).

The swelling may be a pudendal hernia, which originates either as an inguinal or a vaginal hernia.

The swelling may be a retention cyst, the most common of which is cyst of the vulvovaginal gland. For complete enumeration and **differential diagnosis** of vulvar swellings see Chapter II and Chapter IV.

NEW GROWTHS ABOUT EXTERNAL GENITALS

Condyloma, Urethral Caruncle, Lipoma, Fibroma, Malignant Growths

Condylomata are small papillomata, from pin-head to finger-tip size, that appear about the labia and meatus as the result of chronic irritation. They are seen most frequently in gonorrhea and secondary syphilis. Occasionally condylomatous growths unite to form a large mass, as shown in Chapter II.

Caruncle is a papilloma occurring about the meatus. Usually it is extremely tender.

Fibroma, lipoma and other nonmalignant tumors are rare, although they do occur occasionally, fibroma being the most frequent.

Malignant growths in this situation very rapidly reach the stage at which complete extirpation is impossible, hence the importance of recognizing the condition very early.

CONDITION OF HYMEN

Intact, Lacerated, Destroyed

Does the hymen present the virginal appearance, or is it lax and the opening large, as from sexual intercourse, or is it destroyed from labor, being represented by only a few remnants (carunculae myrtiformes)?

CONDITION OF PERINEUM

Wide Opening, Vaginal Walls Visible, Shallow Perineum, Scar-tissue, Fistula

For the detailed diagnosis of lacerations see Chapter II.

VAGINAL EXAMINATION (DIGITAL)

In the vaginal examination, or digital examination, as it is frequently designated, one or two fingers are introduced into the vagina and the structures within reach are palpated. In this way valuable information may be obtained in certain cases. It is also a preliminary step to the important vaginoabdominal or bimanual examination, to be taken up later.

Method of Examination

Use **two fingers** for the vaginal palpation where the size of the vaginal opening will permit. A much deeper and more accurate examination can be made with both the index and middle fingers, than with the index finger alone. Ordinarily in the examination of a married woman, even one who has had no children, two fingers may be introduced without difficulty, provided the fingers are well lubricated and care is taken to cause no pain.

It is important also to separate the labia with the fingers of the other hand while the examining fingers are being introduced, for, if the hair and labia are allowed to roll in with the examining fingers, much pain is caused the patient and the opening is considerably narrowed.

It is advisable to use **rubber gloves** in practically all cases. When intact, they give complete protection against syphilis or other infection which might come through an unnoticed abrasion about the fingers. Another advantage is that less scrubbing of the hands is needed after the examination. Frequent severe scrubbing of the hands and the use of strong antiseptic solutions keep the skin in an irritated, unhealthy condition, particularly in cold weather. When rubber gloves are used, all the infectious material is removed with the gloves, which are washed and boiled and are then ready for the next examination.

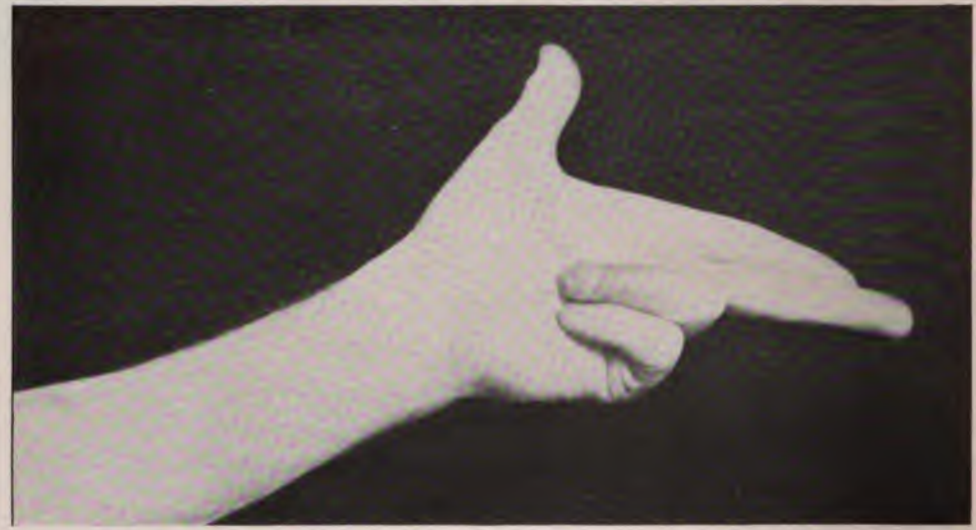


Fig. 62.—Position of the fingers for the vaginal and vaginoabdominal examinations.

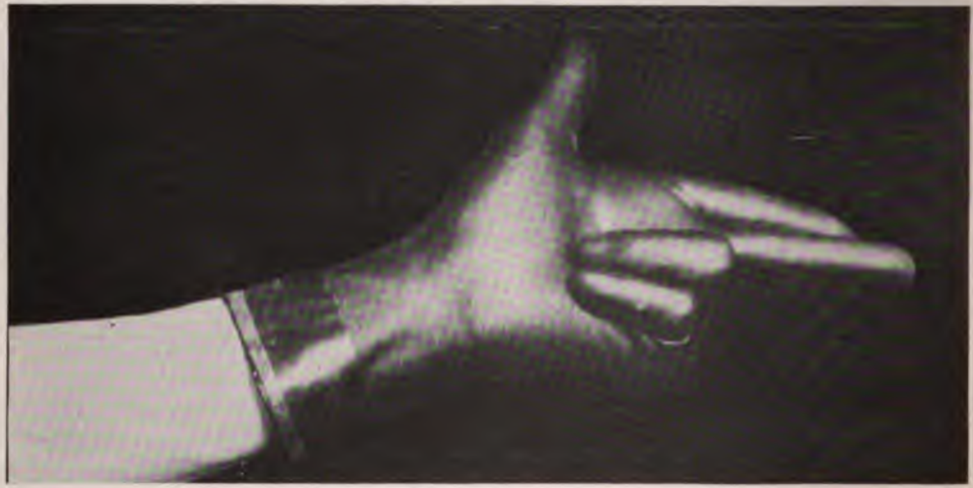


Fig. 63.—Same hand, gloved and ready for the examination.

Fig. 62 shows the **position of the fingers** ordinarily preferable in the vaginal and bimanual examination. Fig. 63 shows the hand gloved and ready for the vaginal examination. Fig. 64 shows the disposition of the outside fingers and the thumb as the examination is being made. The third and fourth fingers are folded into the palm of the hand as far as possible, and care is taken to maintain extension of the thumb, so that it does not infringe upon the genitals in the region of the clitoris. For the same reason, in the deep internal palpation the wrist should be dropped low and the examining fingers directed upward, so as to throw the thumb away from the genitals. In the very deep palpation in the sides of the pelvis, when the thumb is necessarily in the way, it should be turned far to one side or the other, and thus kept from contact with the sensitive areas (Figs. 64, 87). In regard to the disposition of the third and fourth fingers, it is advantageous in some cases, particularly in very stout patients, to extend these fingers along in the internatal fold, as shown in Fig. 88. In these exceptional cases this permits deeper penetration of the examining fingers.

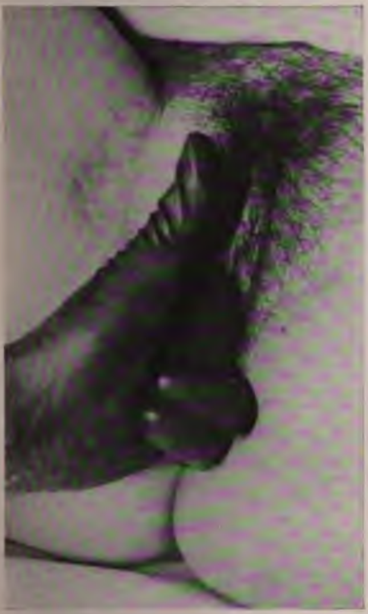


Fig. 64.—The gloved hand making the vaginal examination. The thumb is held well away from the genitals, and the third and fourth fingers are folded into the palm.

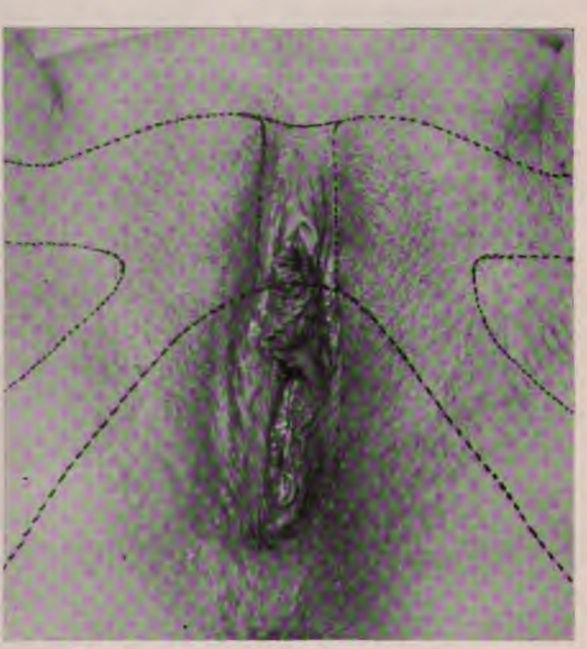


Fig. 65.—The bony arch, which bounds the vaginal opening above. Additional space needed for examination is secured by depressing the perineum.

In beginning the examination, as the examining fingers are being introduced, there is frequently a tendency on the part of the patient, who is nervous for fear of pain or uncertain as to whether there will be pain, to contract the muscles of the pelvic floor and thus interfere with the vaginal examination. In such a case, if one finger be introduced a short distance and steady **pressure backward** be made against the muscle it slowly relaxes and the second finger may be introduced beside the first. Remember, that to obtain more space at the vaginal orifice, either in digital examination or in introducing a speculum, always press downward against the pelvic sling.

Above and to the sides of the opening is the bony arch (Fig. 65), and if an attempt is made to overcome the resistance by direct forward pressure, without depressing the perineum, the soft tissues above are pinched between the finger or instrument and the bony arch, causing the patient pain and increasing the muscular resistance.

In a woman who has borne children the opening usually admits the two fingers easily, the temporary muscular resistance above mentioned being seldom encountered.

What Structures to Palpate

With one or two fingers, well lubricated and introduced into the vagina, palpate the following structures:

Vaginal Walls—Roughness, Tenderness, Discharge, Induration, Swelling, Stricture.
Base of Bladder—Tenderness, Induration.
Urethra—Tenderness, Induration, Discharge.
Vulvovaginal Glands—Tenderness, Induration, Discharge, Red Spot.

Pelvic Floor
Size of opening,
Resistance to backward pressure,
Protrusion of vaginal walls,
Scars and distortions,
Thickness of perineum.

Rectum—Tenderness, Induration, Hemorrhoids, Fistula, Fissure.

Cervix Uteri
Position,
Direction of axis,
Size and shape,
Laceration and eversion of lips,
Condition of external os,
Consistency of cervix,
Tenderness,
Mobility.

Pericervical Tissues—Tenderness, Induration.

VAGINAL WALLS

Roughness, Tenderness, Induration, Swelling, Stricture

In acute vaginitis and in some cases of chronic vaginitis the surfaces within the vagina have a rough, granular feel and are tender on pressure. An astringent douche—for example, a bichloride douche, or one containing zinc sulphate or tannic acid or alum—will cause a similar roughness. But if the vagina is both rough and tender, it is almost certainly inflamed, provided the tenderness is not due to some perivaginal trouble. Of course, the diagnosis of vaginitis does not depend on this alone, but is aided by facts determined in the speculum examination, and also by the history of the

When discharge is found in the vagina, the assumption is that it comes from the uterus unless there are indications of inflammation in the vagina. If the vagina is roughened and tender, the discharge probably originates there. Whether or not it really does originate there, is determined in the speculum examination.

Induration, or a hard place felt at some part of the vaginal wall, may be due to infiltration of the wall itself (inflammation, scar-tissue, small cyst, malignant disease) or to some trouble back of the wall.

A **swelling** or mass in the vaginal wall or bulging into the vagina from any direction may be due to any one of a number of conditions which are mentioned in detail in Chapter II.

A **stricture** (narrowing) or atresia (occlusion) of the vaginal canal may be a congenital malformation or may be an acquired condition resulting from injuries, in labor or otherwise, or from severe or protracted inflammation, as in the adhesive or obliterative vaginitis seen frequently in aged patients. The narrowing of the canal may be due also to pressure of a tumor or an inflammatory mass around the vagina.

BASE OF BLADDER

Tenderness, Induration

The base of the bladder lies directly beneath the central part of the anterior vaginal wall and is readily palpated. In cystitis or other painful affection involving the base of the bladder, **tenderness** is found. When **induration** or abnormal hardening or thickening is found, ascertain whether it is a distinct mass with definite outlines (foreign body or tumor of the bladder), or a diffuse infiltration (inflammatory, tuberculous, malignant) of the bladder wall or of the vesicovaginal septum.

URETHRA

Tenderness, Induration, Discharge

The urethra, as it extends from the bladder forward under the pubic arch, is easily palpated through the anterior vaginal wall, immediately beneath which it lies. In inflammation of the urethra there is usually considerable **tenderness,** and, in many cases, decided **induration** or thickening. A thickening due to a new growth may be easily outlined in this way. Palpate the urethra from within outward—i.e., from the bladder toward the meatus. The palpation is more accurately and conveniently accomplished in that way, and at the same time any **discharge** in the urethra is carried to the meatus, where it is seen and a specimen secured for microscopic examination.

Remember that inflammation may persist indefinitely in Skene's glands, just within the meatus. To secure secretion from the glands for examination in such cases, introduce the index-finger within the vagina and compress the urethra just back of the meatus, and then move the finger forward. In parous women the opening of each gland may often be found by rolling out the urethr [illegible] htly and examining closely for the opening (Fig. 58).

VULVOVAGINAL GLAND

Tenderness, Induration, Discharge, Red Spot

The vulvovaginal gland (gland of Bartholin) of each side lies just lateral to the remnants of the hymen, and opens by a short duct in front of and a little below the middle of the lateral margin of the hymenal attachment. A convenient way to palpate the glands is to catch the tissues lateral to the gland opening (the opening may be easily seen in the situation just described) between a finger in the vagina and the thumb outside (Fig. 61).

When normal the gland is scarcely noticeable by ordinary palpation. When inflamed, however, there is **thickening**, and the gland is felt as a small firm nodule.

There is **tenderness** also, and, if the gland is pressed upon, some **discharge** (pus) may appear from duct. Make a smear preparation of this for staining for gonococci.

In a case of abscess or cyst the nodule will be much larger. A well-marked red spot or small red area involving the opening of the gland duct indicates previous inflammation of the duct, and is presumptive evidence of a previous gonorrheal infection (as other forms of inflammation seldom involve the gland or duct), and should always lead to further investigation, to establish the presence or absence of this disease.

PELVIC FLOOR

Size of Vaginal Opening, Resistance to Backward Pressure on Pelvic Floor, Protrusion of Vaginal Walls, Scars or Distortions, Thickness of Perineal Body

Is there loss of support at the pelvic outlet? Is there so much relaxation, due to imperfect healing of an **open tear** or of a **subcutaneous tear**, or due to **subinvolution** of the pelvic sling, that the pelvic organs are not satisfactorily supported? To determine this, investigate the following points:

Size of Vaginal Opening.—In the adult virgin the opening in the hymen will usully admit the index finger without much stretching. In a married woman two fingers can usually be introduced for examination without causing pain, provided the care previously mentioned is exercised.

If the vaginal opening will readily admit three fingers, it is decidedly enlarged and there is considerable interference with the integrity of the perineal body. The perineal body is not, however, an important factor in the real supporting power of the pelvic floor; hence a relaxed vaginal opening does not necessarily mean a relaxed pelvic sling, though it usually accompanies it.

Resistance to Downward and Backward Pressure on the Pelvic Floor.—Usually in the woman who has borne children there is not the firm support back of the posterior vaginal wall, and extending well up toward the cervix, that is found in nullipara. There is not, however, the marked difference one would naturally expect from the enormous stretching that necessarily takes place in childbirth. The provisions of Nature for the restoration of the parts to nearly their former condition are wonderfully effective when not interfered with by tears or overstretching or subinvolution.

A satisfactory method of testing the integrity of the pelvic floor is to turn the two examining fingers backward and push down and outward, as shown in Fig. 66, at the same time separating the fingers as widely as possible. The wide separation of the fingers, indicated in Fig. 67, when made within the vagina, tests the support on each side. This maneuver gives a very good idea of the support furnished by the pelvic sling and of the amount of downward displacement of the pelvic organs possible when the patient is standing.

The resistance in each sulcus may be tested with the index finger, as shown in Fig. 68, to determine if there has been a tear with consequent relaxation in that region. A more effective method is to introduce the two index fingers side by side, into the vagina and then separate them widely in a direction downward and outward (Fig. 69). If the fingers can be carried to the bony sides of the arch with but little muscular resistance, the front part of the levator ani muscle and accompanying fascia has been torn, and there is decided loss of support in the pelvic floor. If now the patient be directed to bear down, the loss of support becomes still more evident.

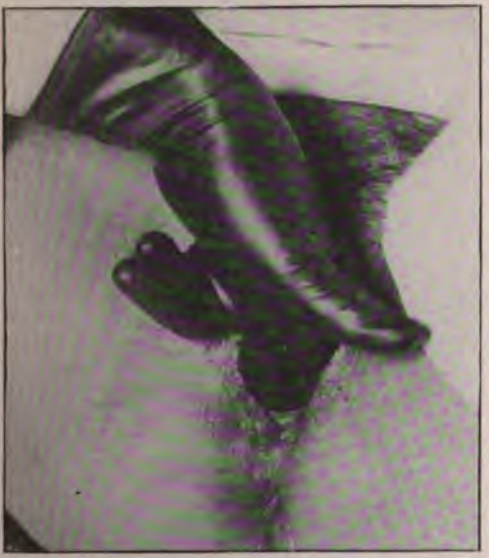


Fig. 66.—Testing the pelvic floor. The vaginal fingers are separated widely, as explained in Fig. 67, and pressed downward.

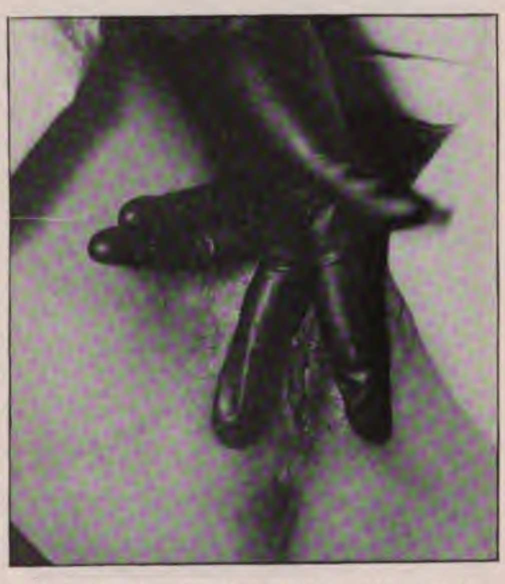


Fig. 67.—Showing the relative position of the fingers when in the vagina, while testing the pelvic floor.

Occasionally, even in case of marked injury to the pelvic sling, the support will seem very good during the first part of the examination because of the muscular tension. The strong fascial layer of the pelvic sling probably constitutes the principal factor in continuous support, for the muscles cannot contract continuously. The fascia may be so torn and stretched that it furnishes little or no continuous support, and yet, as long as the muscles stay ted, there seems to be a fairly good pelvic floor. Any error in this ay be avoided by watching for it as the muscles relax.

Protrusion of Anterior or Posterior Wall.—To further test the loss of support, separate the labia and instruct the patient to bear down. The resulting bulging of the structures gives some idea of how poorly the pelvic floor supports the organs, provided the patient really bears down when she thinks she does. The downward displacement of the vaginal walls and pelvic diaphragm may be still further shown by introducing the two examining fingers and pressing backward and downward, at the same time separating the fingers widely, as mentioned in testing the strength of the pelvic floor.

When the patient is in the upright posture, this downward displacement of the vaginal wall is of course more marked, particularly in cases of prolapse of uterus and vaginal walls. But it is rarely necessary to examine a patient in the standing posture, for the diagnosis as to the character and extent of her trouble may usually be made without it.

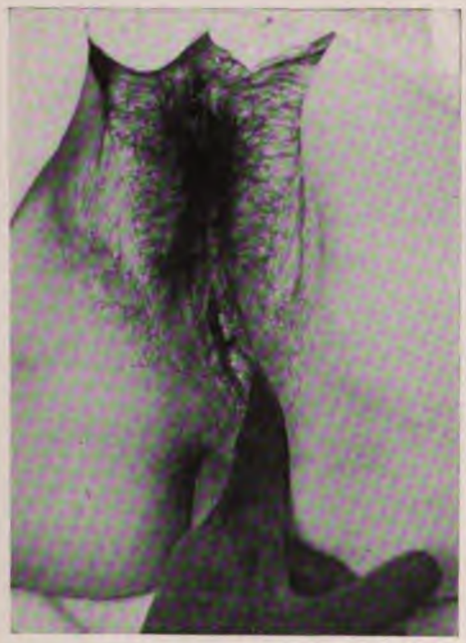


Fig. 68.—Testing the pelvic floor, especially the left sulcus.

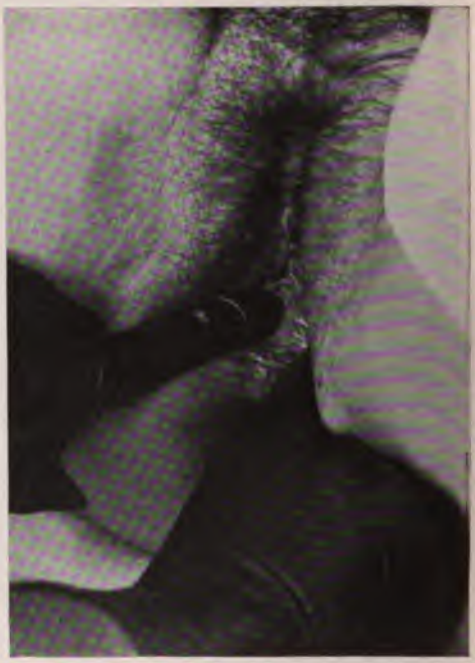


Fig. 69.—Testing the pelvic floor by two fingers introduced into the vagina and then separated.

Scars or Distortions of Vaginal Wall or Perineum.—Sometimes there are deep scars running up the vaginal wall at the site of tear, indicating a severe injury of the pelvic sling. These scars may extend out into the perineum and be seen in the inspection already mentioned.

When there has been **laceration of the sphincter ani muscle,** the torn ends are drawn apart, their location being indicated by a small dimpled scar at each side of the anus. The appearance in ordinary lacerations and relaxation of the pelvic floor and also in laceration of the sphincter ani muscle are shown in the illustrations in the chapter dealing with that subject (Chapter V).

RECTUM

Tenderness, Induration, Hemorrhoids, Fistula, Fissure

Above the perineum the anterior rectal wall is closely applied to the posterior vaginal wall. Turn the examining fingers so that the palmar surfaces are directed backward, and palpate the rectum. If there is any painful affection in that portion of the rectum, there will be decided **tenderness.** If an **induration** is felt, determine whether it is a distinct mass with definite outlines (foreign body, fecal material, tumor in rectum), or a diffuse infiltration (inflammatory, syphilitic, tuberculous, malignant). Very frequently firm fecal masses will be felt through the posterior vaginal wall. Sometimes these are large enough to cause a bulging of a part of the wall, while in exceptional cases they are so large as to interfere decidedly with bimanual examination. In the lower part of the rectum these masses cause no trouble in diagnosis, for in that situation their character is easily recognized. In the upper part of the rectum, however, and in the sigmoid region such a mass may cause confusion in diagnosis, for it may resemble a prolapsed ovary or an inflammatory mass in the culdesac or about the tube.

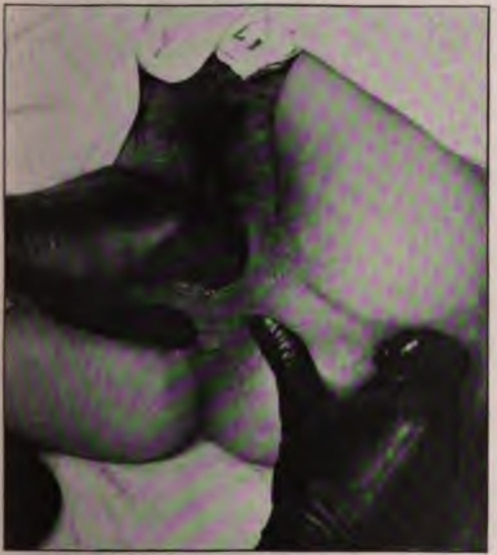


Fig. 70.—Method of everting the anal tissues for inspection.

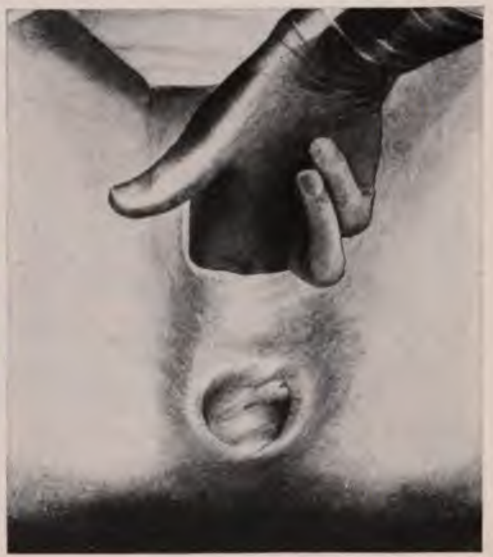


Fig. 71.—Indicating the amount of possible eversion of anal tissues when the pelvic floor is lax. (Dudley—*Practice of Gynecology*.)

The distinguishing characteristics of a **fecal mass** are three: (a) it is not particularly tender, (b) it has usually a putty-like consistency and may be dented, the dent remaining, and (c) it may sometimes be pushed along to a different position in the bowel. In a doubtful case the bowels should be moved thoroughly by a purgative and the rectum cleared with an enema, and the patient again examined.

In a patient with a lax pelvic floor the anal tissues may be everted by pressure from within the vagina by one or two fingers, as indicated in Fig. 70. When the tissues are very lax, the anus may be opened widely and the rectal mucosa exposed (Fig. 71). This turning out and examination of the anal tissues is advisable whenever there is pain on defecation, or bleeding or other evidence of trouble in this region. In this way the presence or absence of **hemorrhoids** or **fistula** or **fissure** may be determined.

CERVIX UTERI

Position, Direction of Axis, Size, Shape, Laceration with Eversion of Lips, Size and Shape of External Os, Consistency of Cervix, Tenderness, Mobility, Attachments

The cervix uteri is felt at the upper end of the vagina as a firm, conical body, projecting through the upper portion of the anterior wall (Figs. 72, 73). It is distinguished from the surrounding vaginal wall by its greater hardness.

Position of Cervix.—The normal position of the cervix is from three to three and one-half inches from the vaginal orifice. The fingers are carried toward the top of the vagina until the tip of the finger touches the cervix. If the vaginal orifice comes well up to the upper end or the third joint of the finger, the cervix is in normal position (the author assumes a hand of average size, with index finger about three and three-fourths inches long). If the cervix is encountered by the finger before it is introduced that far, the cervix is too low. If not encountered at that point, it is too high. Another method of determining the position of the cervix is to ascertain whether it is above or below the level of the ischial spines, for normally the lower margin of the cervix lies approximately at the interspinal line.

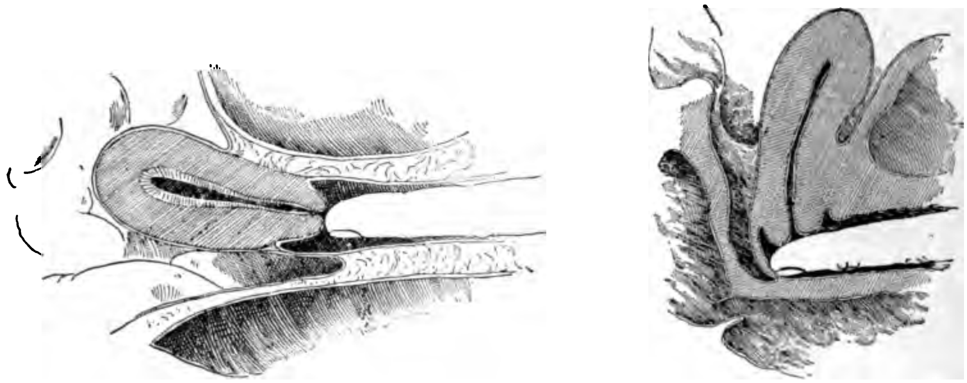


Fig. 72. Fig. 73.

THE RELATION OF THE CERVIX TO THE EXAMINING FINGER.

Fig. 72.—Retroversion of the Uterus, showing the Relation of the Cervix to the examining finger. Compare this with Fig. 73, which shows the relation of the cervix to the examining finger when the uterus is in normal position. (Keating and Coe—*Clinical Gynecology.*)

In cases where, after examination in the dorsal posture, it is still uncertain as to whether or not there is serious descent of the uterus, the patient may be examined in the standing posture. The patient stands, with one foot slightly elevated on the round of a chair or on a small stool, while the examiner, sitting on a chair in front of her, makes the vaginal examination. In this posture a decided descent of the uterus, which might disappear when the patient lies down, is at once appreciable. Examination in this position is employed also to detect the ballottement of early pregnancy in doubtful cases. Examination in this posture, however, is rarely required, for in almost all cases the information necessary to a diagnosis may be obtained by the more common methods of gynecologic investigation.

Direction of Cervix.—Determine whether the cervical canal, i.e., the axis of the cervix, points **across** the vagina above toward the coccyx as it should (Figs. 1, 3, 73), or **along** the canal as shown in Fig. 72. Direction of the cervix forward along the vaginal canal is usually due to backward displacement of the uterus (Fig. 72). However, it is sometimes due simply to anteflexion of the cervix as indicated in Fig. 74. Figs. 75 and 76 show other conditions associated with anteflexion of the cervix, which may cause confusion and a mistake in diagnosis.

Size and Shape, Laceration and Eversion, Condition of External Os.—The size and shape of the cervix varies much in different individuals, and in the same individual at different periods of life. In women who have never been pregnant the normal cervix has the shape of a rounded cone about one inch wide, and projects into the vagina from one-half to three-quarters of an inch. The external os is small and round, and is at the flattened apex of the cone.

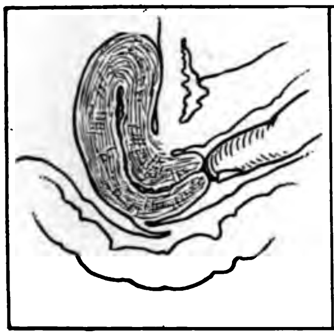


Fig. 74.

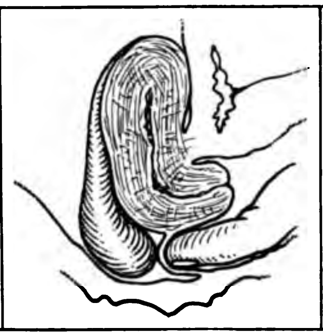


Fig. 75.

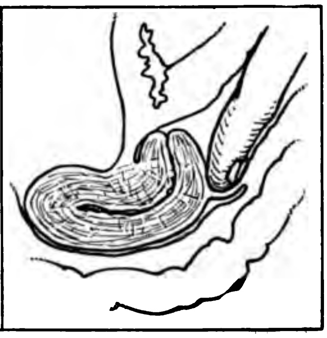


Fig. 76.

Fig. 74.—Digital examination, anteflexion of cervix.
Fig. 75.—Digital examination, enlarged tube in culdesac.
Fig. 76.—Digital examination, retroversion of uterus.

In certain abnormal cases the cervix is very long (an inch to an inch and a half) and pointed. This condition is known as conical cervix. It is frequently accompanied by a very small external os ("pinhole os"), and is one cause of sterility.

In women who have borne children the cervix is larger and broader, and comparatively shorter. The os is a transverse slit and is irregular in shape (Figs. 77, 78), and may be large enough to admit the finger-tip. There are usually small scars and irregular depressions from lacerations in labor (Figs. 79, 80). When the cervix has been severely lacerated, there may be two or three distinct lips (Figs. 81, 82). Again, it may, on account of chronic inflam-

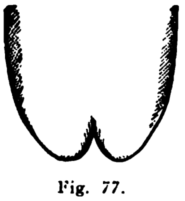


Fig. 77.

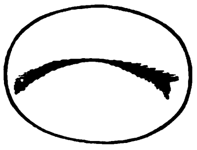


Fig. 78.

Figs. 77 and 78.—Side and front views of a simple bilateral laceration, requiring no treatment.

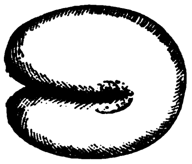


Fig. 79.—Front view of a unilateral laceration requiring no treatment.

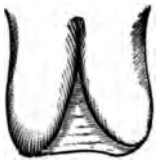


Fig. 80.—Side view of a unilateral laceration. Such a laceration may cause abortion in the early months of pregnancy.

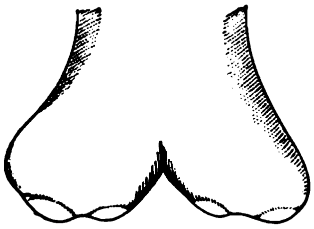


Fig. 81.—Side view of a bilateral laceration, requiring treatment. The lips are everted, and the Nabothian follicles stand out as small hard lumps.

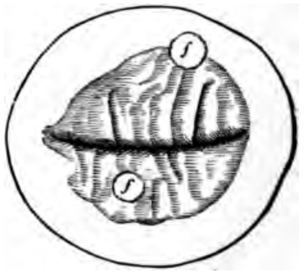


Fig. 82.—Front view of a bilateral laceration, showing eroded area and Nabothian follicles.

Figs. 77 to 82.—Lacerations of the Cervix Uteri. (Baldy—*American Textbook of Gynecology.*)

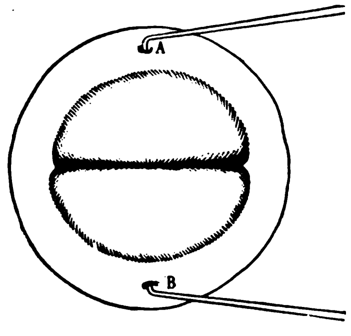


Fig. 83.

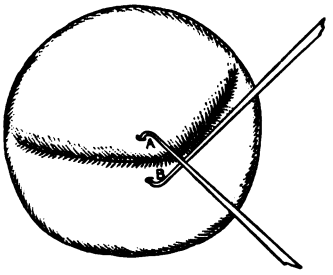


Fig. 84.

Figs. 83 and 84. Testing for the extent of the tear, in cases where the cervix has the appearance of a ball. The center of the anterior lip (*A*. Fig. 83), and of the posterior lip (*B*) are each caught, with a tenaculum and brought together, as indicated in Fig. 84. (Baldy—*American Textbook of Gynecology.*)

mation, become enlarged to two or three times its normal size and may be felt as an irregular ball at the top of the vagina (Figs. 83, 84).

Consistency.—The normal cervix is like hard connective tissue, almost as hard as tendon. Its consistency is closely approached by that of the end of the nose when firmly pressed upon. During pregnancy the cervix softens, the softening beginning at the lower end and gradually involving more and more as pregnancy advances (Fig. 85). The softening is so marked that the softened portion is sometimes missed entirely, the cervix being apparently simply shortened. This is what gave rise to the former idea that the cervix became gradually shortened as pregnancy advanced. The softened portion feels like thick velvet or a fold of vaginal wall as it slips back and forth beneath the examining finger. It is hard to describe satisfactorily, but when once felt is easily recognized afterward. A partial idea of it may be secured by the following experiment. Cover a finger with a piece of heavy velvet with a very thick nap, the nap side out. Then shut the eyes and with the other hand, with the fingers usually used in vaginal examination, endeavor to make out exactly the thickness of the nap by passing the fingers over it with varying pressure and in different directions. First make firm pressure so as to appreciate the fingers beneath, then make light pressure so as to estimate the thickness of the nap. These same maneuvers are carried out in appreciating the presence and extent of marked softening of the cervix.

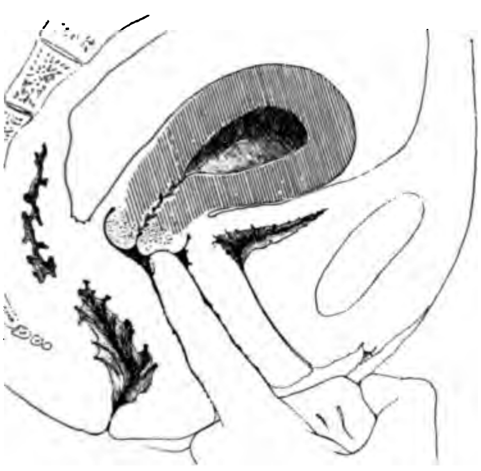


Fig. 85.—Palpating the cervix to determine softening. The light stippled area represents the softened portion. The uterus is represented as enlarged from early pregnancy.

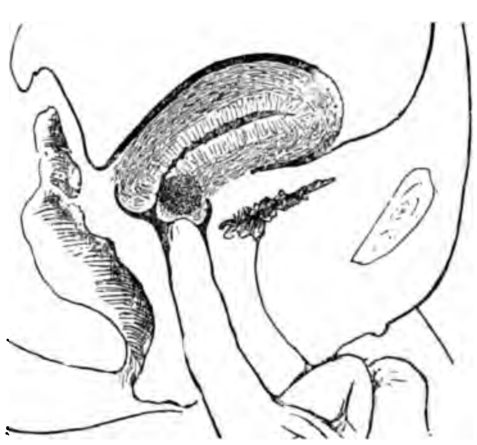


Fig. 86.—Beginning carcinoma within the cervix, causing a hard nodule, which can be felt on digital examination. (Kelly—*Operative Gynecology*.)

This softened velvety condition of the cervix is very characteristic and should always arouse suspicion of pregnancy. Some softening of the cervix is found in certain cases of inflammation of the cervix, and also in cases where its circulation is interfered with, as when the pelvis is filled with a tumor or with a mass of inflammatory exudate, or where there is marked displacement of the uterus.

Abnormal **hardening** of a portion of the cervix may be due to scar tissue, to cystic disease, to a myoma nodule or to malignant infiltration (Fig. 86).

Tenderness of Cervix.—The cervix is much less sensitive than the vaginal wall, and rarely becomes very sensitive even when diseased. The pain complained of when the cervix is pressed upon is usually due to the pulling upon inflamed periuterine structures, by the resulting movement of the uterus.

Mobility of Cervix.—Normally the cervix is freely and painlessly movable for a short distance in all directions. Its range of mobility may be diminished by scar tissue or by malignant infiltration in the upper part of the vagina, or by an inflammatory exudate in the pelvis, or by a uterine tumor or by any pelvic tumor that fixes the uterus. Its range of mobility may be increased by laceration or overstretching of the supports, posteriorly or anteriorly or laterally, a frequent accompaniment of pelvic floor injuries.

Attachment of Cervix.—Is the cervix attached or fixed to the pelvic wall at some point? If so, where and by what?

PERICERVICAL TISSUES

Tenderness, Induration

The tissues about the cervix, immediately beneath the vaginal wall, may be palpated, and tenderness or induration noted. If induration is present, note whether it is a distinct, well-defined mass or diffuse infiltration and thickening of the tissues.

VAGINOABDOMINAL EXAMINATION (BIMANUAL)

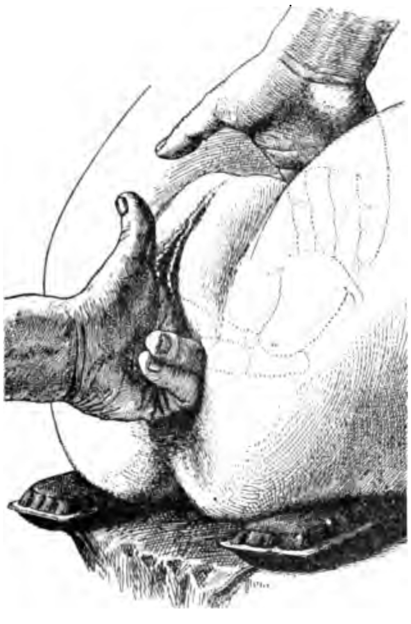


Fig. 87.—Bimanual examination, showing also the disposition of outside fingers and left thumb. (Kelly—*Operative Gynecology.*)

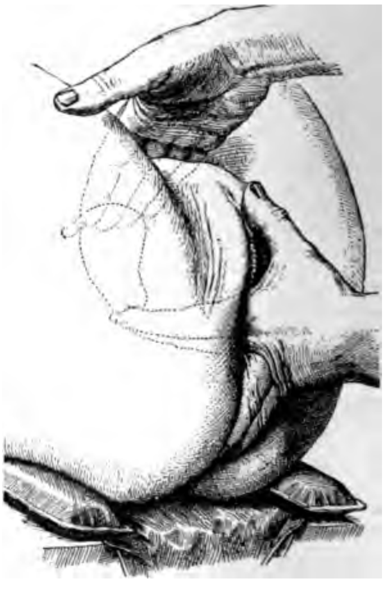


Fig. 88. Showing the other disposition of third and fourth fingers along the gluteal crease. This allows deeper penetration of the examining fingers in certain exceptional cases, particularly in very stout patients. (Kelly—*Operative Gynecology.*)

The vaginoabdominal examination is, as its name implies, an examination from the vagina and the abdomen at the same time. The pelvic structures are caught between the fingers in the vagina and the fingers over the abdomen, and carefully examined by indirect touch (Figs. 87, 88, 89). By it the body of the uterus is located and outlined. The region to each side of the uterus is palpated and also the space back of the uterus. It is determined whether there is any abnormal mass in the pelvis or whether there is any area of marked tenderness.

To the beginner in gynecologic work this important bimanual examination is often unsatisfactory. He has heard a great deal about tubal and ovarian disease, and he expects to feel the tube and ovary at once. He examines a patient, or several patients, and can feel neither tube nor ovary if they are normal. Then he is discouraged, and thinks that he has learned nothing from the examinations. And probably he has not learned much, for the simple reason that he was feeling for something that he could not feel, and did not know the significance of what he did feel. Close attention to the details of the examination will prevent this unprofitable experience.

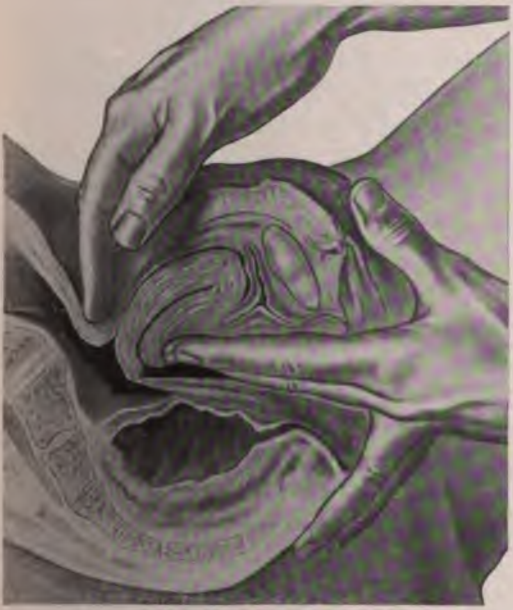


Fig. 89.—Showing the third step in the palpation of the uterus. (Montgomery—*Practical Gynecology.*)

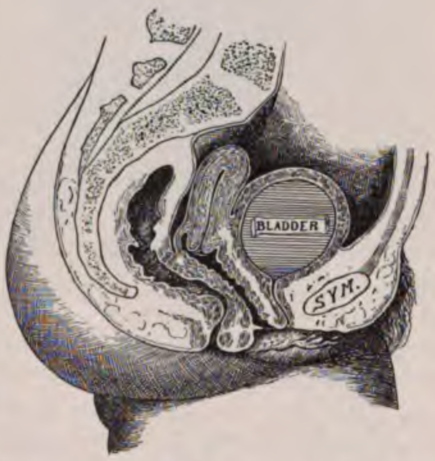


Fig. 90.—Uterus displaced backward by a full bladder. (Montgomery—*Practical Gynecology.*)

The information concerning the Bimanual Examination may be divided as follows:

Palpation of Uterus—Position, Size, Shape, Consistency, Tenderness, Mobility, Attachments.

Palpation of Tuboovarian Region—Mass, Induration, Tenderness.

Palpation of Other Regions—Mass, Induration, Tenderness.

General Observations—Importance of the Educated Touch, Train One Hand, Use Two Fingers, Examine Deeply in Pelvis, May w Down Uterus, Preferable Position for Examiner, Condi- Different Patients, Get Intestines out of the Way, Diminness.

PALPATION OF BODY OF UTERUS

Position, Size, Shape, Consistency, Tenderness, Mobility, Attachments

LOCATING THE CORPUS UTERI

Steps.—The locating of the corpus uteri will be much facilitated by proceeding as follows:

1. With two fingers in the vagina, locate the cervix and then push the cervix backward and upward (Fig. 93).

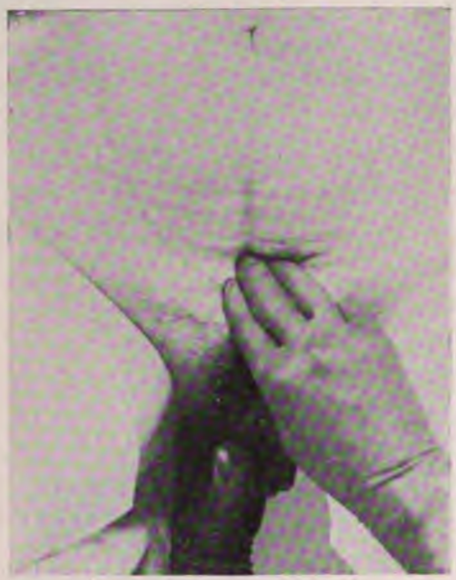


Fig. 91.—Depression of abdominal wall too close to the pubes. Outside view.

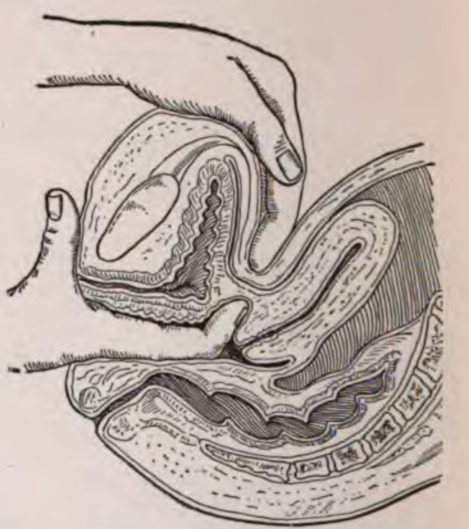


Fig. 92.—Depression of the abdominal wall too close to pubes. Sectional view. (Ashton—*Practice of Gynecology.*)

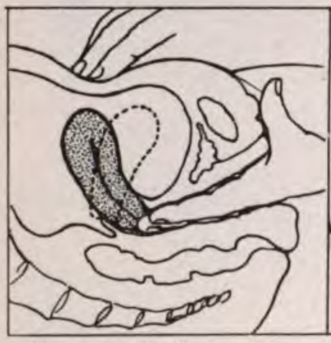


Fig. 93.

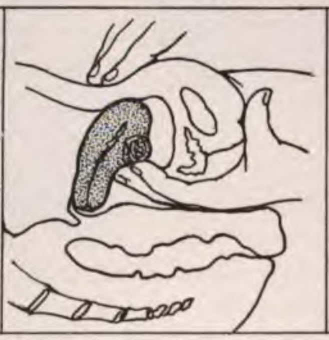


Fig. 94.

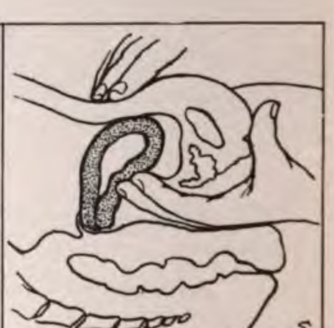


Fig. 95.

Fig. 93.—Pushing the cervix back and upward, so as to tip the corpus uteri forward within reach of the abdominal fingers.

Fig. 94.—Palpating a nodule on the anterior surface of the corpus uteri.

Fig. 95.—Palpating softening or fluid in the corpus uteri.

2. Then, with the fingers of the abdominal hand depressing the abdominal wall into the depth of the pelvis back of the uterus, bring the fundus uteri well forward.

3. Then, with the pressure still maintained in the direction indicated, slip the vaginal fingers in front of the cervix (Fig. 94). The body of the uterus is thus caught firmly between the fingers below and above, and may be clearly felt and outlined.

Three Common Errors.—The following errors are made so often by students and practitioners that the author thinks it advisable to call particular attention to them.

Error 1. Depression of the Abdominal Wall too Close to the Pubes.—If the uterus happens to be far forward, this causes no trouble, but if the uterus is very high, as it frequently is from a few hours' urine in the bladder (Fig. 90) or other normal or abnormal cause, the depression of the wall close to the pubes tends to push the uterus backward (Figs. 91, 92). Consequently it is not felt between the examining fingers, though there is no real displacement or was none before the examination was begun.

To **avoid this error,** depress the abdominal wall near the promontory of the sacrum, about midway between the pubes and the umbilicus. In particularly difficult cases it is well to start very high and bring the fingers down upon the sacral promontory, and then allow them to slip over the promontory into the posterior part of the pelvis. They are then brought forward until the body of the uterus is felt or until the vaginal and abdominal fingers are so closely approximated that the absence of the uterus from that part of the pelvis is demonstrated.

Error 2. Frequent Shifting of the Position of the Abdominal Fingers.—Some students gouge about in the lower abdomen in various directions in an effort to feel the fundus uteri with the abdominal fingers. This is likely to make the examination a failure in a normal case and it is almost certain to do so in a difficult case. Remember that tension of the abdominal wall interferes with the examination and may defeat it entirely. Remember also that the tension is increased by frequent movements of the abdominal fingers, such as placing them in one position after another in rapid succession, and particularly by endeavoring to gouge in rapidly and forcibly in various parts of the pelvis in an endeavor to overcome the resistance of the wall. Keep in mind that most of the effective palpation is done with the vaginal fingers, the principal function of the abdominal fingers being to bring the body of the uterus within reach of the vaginal fingers and then hold it there while palpation is being carried out. Get clearly in mind just exactly what movements are necessary to best palpate the uterus.

In order to **avoid this error** just mentioned, place the abdominal fingers so that the depression of the wall will be into the back part of the pelvis, and then carry the fingers by steady and continuous pressure toward the desired region. When you have advanced the fingers as far as possible, hold them there steadily and direct the patient to take a deep breath and then to let the breath all out. As expiration takes place, the fingers may be carried deeper into the pelvis—not by any sudden forcing movement, but by strong steady pressure that does not excite muscular contraction and resistance. If still the fingers are not deep enough in the pelvis, the same movements may be repeated several times. Because the uterus is not felt at once, do not cease the pressure there and begin to depress the wall at some other place. Start the fingers in the right direction at first and then keep them going in that direction steadily, firmly, persistently, without relaxing the pressure, until the depth of the pelvis is reached and the uterus felt.

In the subsequent steps of the palpation of the uterus the slight movement of the abdominal fingers that is necessary to bring them in position for good counter-pressure at the various parts of the uterus may usually be made without relaxing the pressure, as the skin is loose enough to be slipped about over the underlying structures.

Error 3. Examining with Partly Filled Bladder.—If the body of the uterus is not felt in front and still the abdominal fingers cannot be brought well together, have the patient empty the bladder and then examine again. A partly filled bladder is not felt as a distinct mass, and yet there may be half a pint or more of urine—enough to make the palpation very unsatisfactory. The peculiar thing about this condition is that there is nothing to indicate it, except the difficulty in locating the body of the uterus in deep palpation. No mass is felt and the tissues are all soft and yielding and there is no particular pain. The fingers seem to sink into the pelvic tissues well, but for some unaccountable reason the uterus is difficult to feel. It seems too far back in the pelvis and yet when you try to bring the fingers together in front of it, they do not come together well. When such a condition is encountered in an apparently normal abdomen (no marked obesity or muscular tension) it is probably due to a collection of urine in the bladder or to intestinal coils in the pelvis. If it does not disappear after the bladder is evacuated,

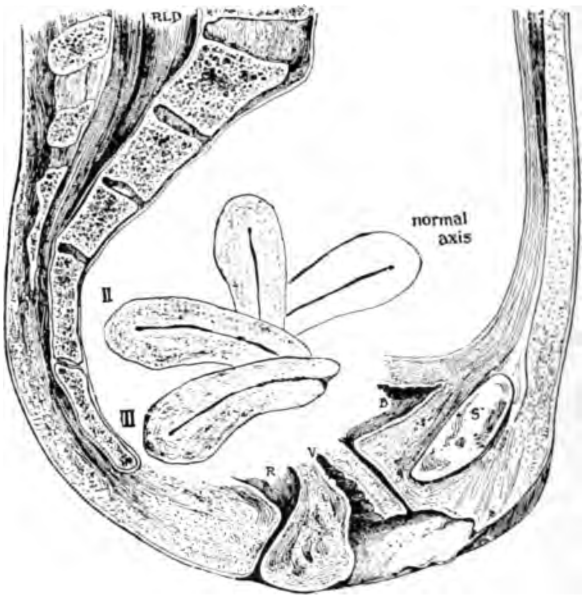


Fig. 90.—Retrodisplacement of the uterus, showing the first, second and third degrees. (Skene—*Diseases of Women.*)

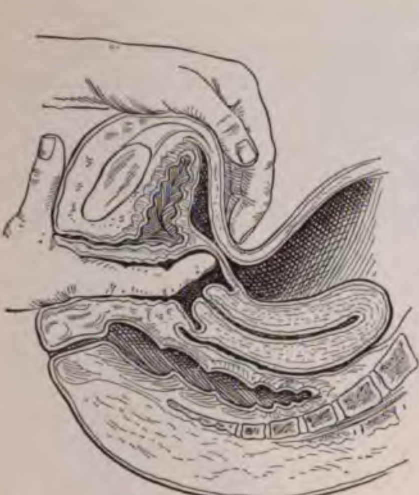


Fig. 97.—Explaining one condition in which the uterus is not found in the front part of the pelvis. (Ashton—*Practice of Gynecology.*)

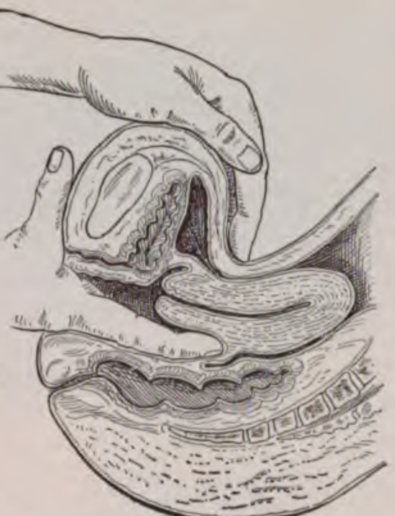


Fig. 98.—Search is then made in the posterior part of the pelvis, and the uterus is found in retroversion. (Ashton—*Practice of Gynecology.*)

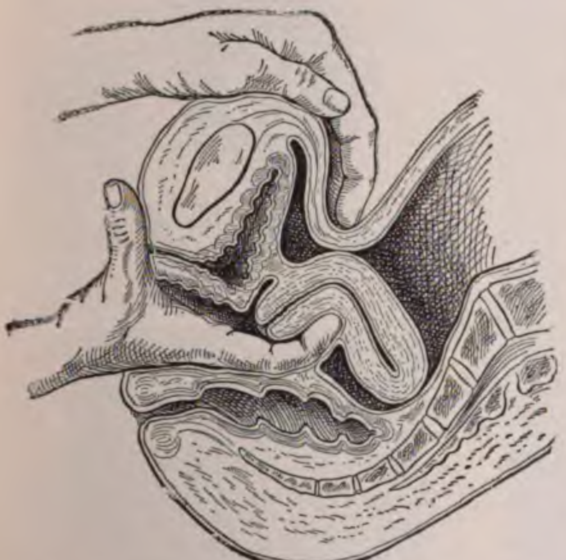


Fig. 99.—Indicating the examination findings when the uterus is in retroflexion. Notice the marked angle which is palpable posteriorly at the junction of the cervix and corpus uteri. (Ashton—*Practice of Gynecology.*)

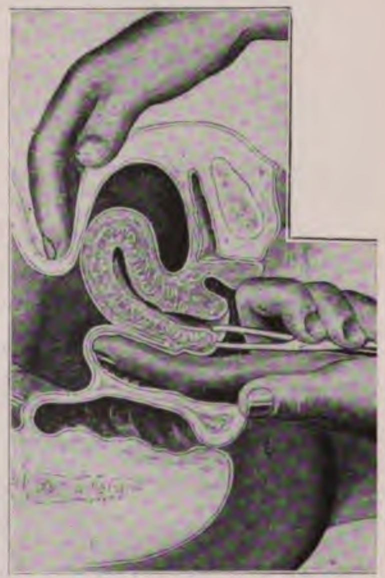


Fig. 100.—Drawing the uterus down with a tenaculum-forceps to bring it within reach of the examining fingers. (Dudley—*Practice of Gynecology.*)

then elevate the patient's hips, to get the tympanitic intestinal coils out of the pelvis.

To **avoid this error** have the patient empty the bladder shortly before the gynecologic examination. If she cannot urinate she may be catheterized if conditions are found sufficiently doubtful to warrant it. As a rule a spontaneous urination in the upright posture empties the bladder better and is [illegible] than catheterization.

The body of the uterus may be displaced backward (Fig. 96). If it is not found in front of the cervix (Fig. 97), then search behind the cervix (Figs. 97, 98, 99) and then to each side of it. If the patient has no mass obstructing the pelvis and no tension of the abdominal wall, the body of the uterus should be distinctly made out. This identification and outlining of uterus may be assisted in a difficult case by pulling the uterus somewhat downward, as indicated in Fig. 100.

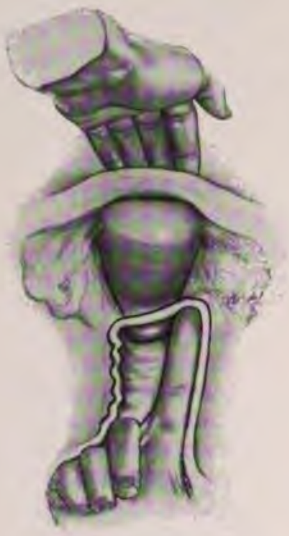


Fig. 101.—Palpating the margin of the uterus, to determine enlargement or irregularity. (Edgar—*Practice of Obstetrics.*)

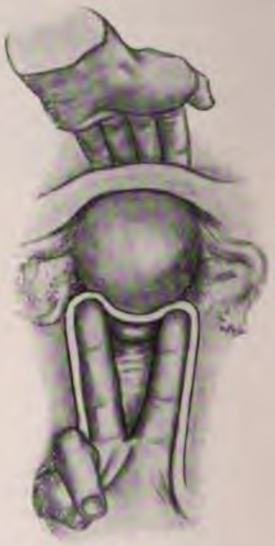


Fig. 102.—Estimating the width of the uterus by separating the vaginal fingers so that one goes to each side of the uterus. (Edgar—*Practice of Obstetrics.*)

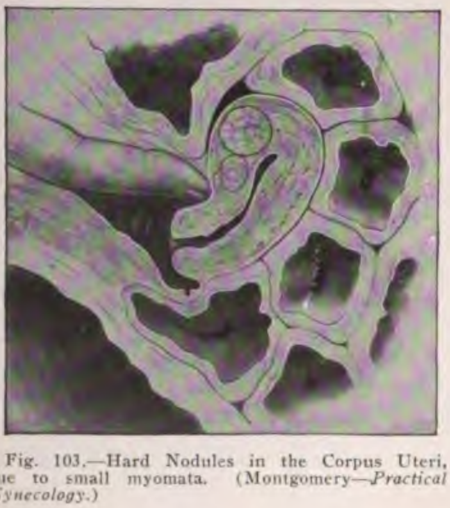


Fig. 103.—Hard Nodules in the Corpus Uteri, due to small myomata. (Montgomery—*Practical Gynecology.*)

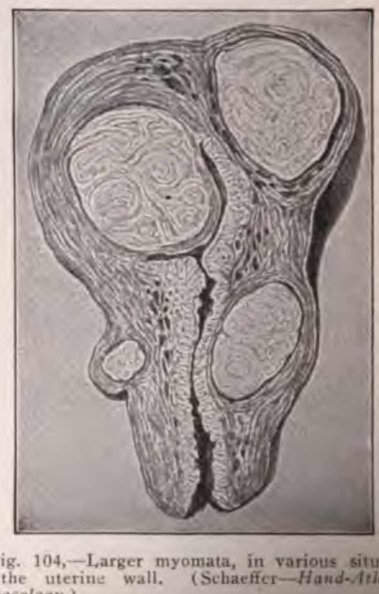


Fig. 104.—Larger myomata, in various situations in the uterine wall. (Schaeffer—*Hand-Atlas of Gynecology.*)

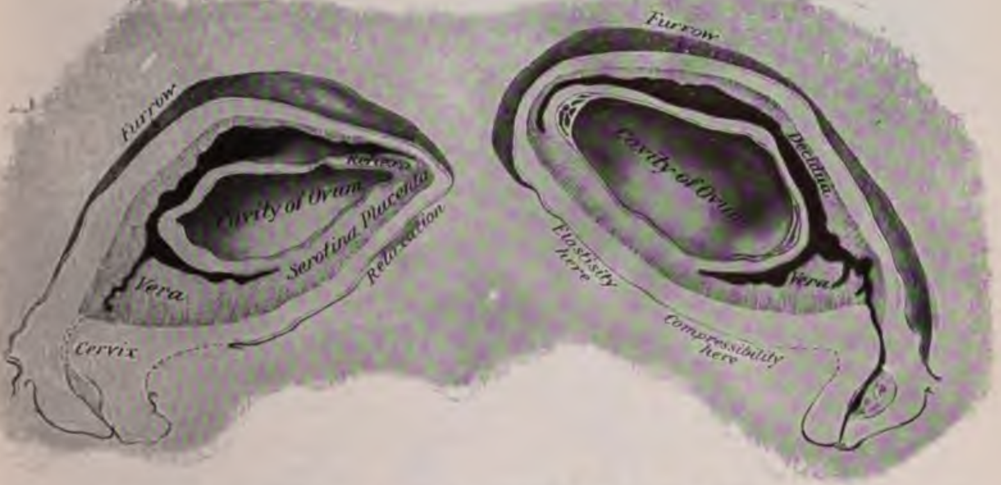


Fig. 105.—A sectioned uterus in early pregnancy, showing the two halves and the interior arrangement which gives Hegar's sign. (Edgar, after Pinard—*Practice of Obstetrics.*)

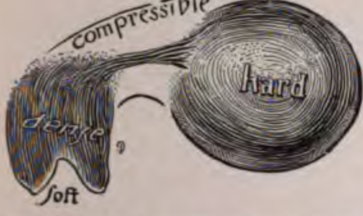


Fig. 106.—Showing the sensations imparted to the examining fingers by different portions of the uterus in early pregnancy, particularly the marked compressibility of the portion just above the internal os (Hegar's sign). (Dickinson—*American Textbook of Obstetrics.*)

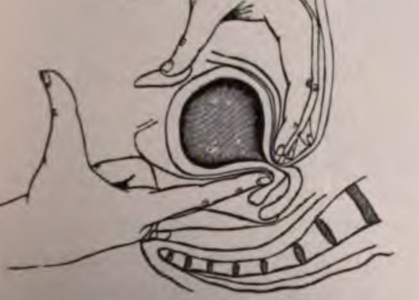


Fig. 107.—Palpating for Hegar's sign, with the uterus forward in the usual position. (Edgar—*Practice of Obstetrics.*)

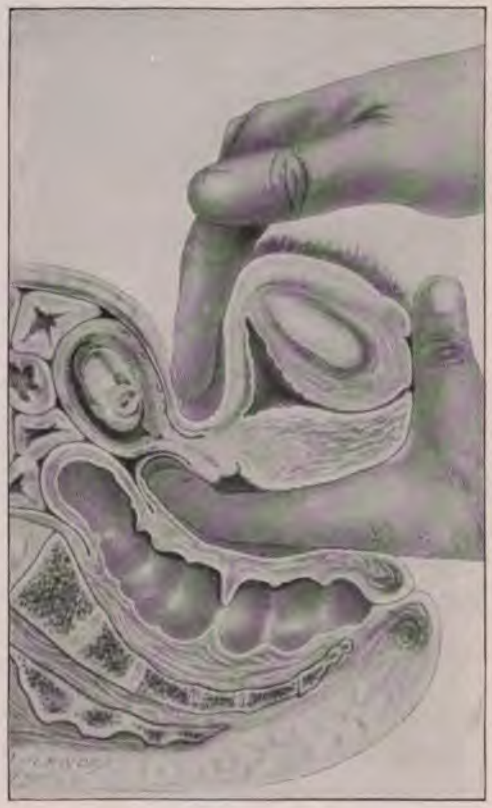


Fig. 108.—Palpating for Hegar's sign, with the fundus uteri pushed backward, the abdominal fingers being in front and the vaginal fingers back of the cervix. (Williams—*Obstetrics.*)

Facts to Determine

When the body of the uterus has been located, then fix in mind the following facts concerning it:

1. **Position** of the Corpus Uteri. Is it in anterior position, as it should be, or is it displaced backward or down to one side?

2. **Size** of Corpus Uteri. Is it apparently normal in size (about three inches long) or is it as large as the fist, or as large as a child's head? Figs. 101 and 102 indicate the method of palpating the margin of the uterus and also the method of determining its width by separation of the vaginal fingers.

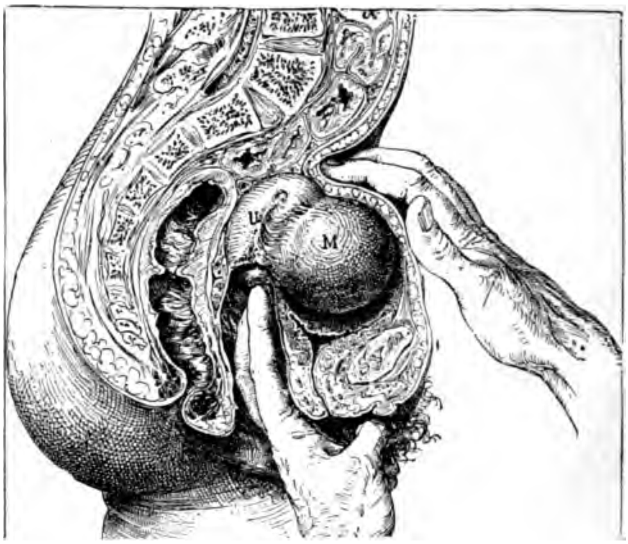


Fig. 109.—Method of determining how intimately a mass is attached to the uterus. Palpating the sulcus between the two. (Kelly *Operative Gynecology*.)

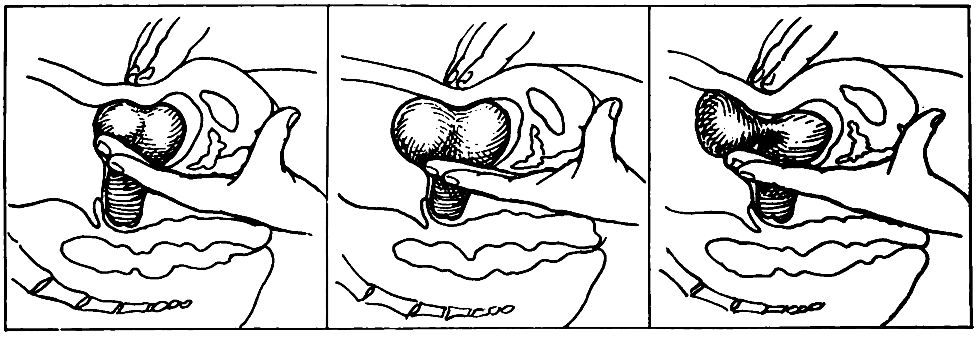


Fig. 110. Fig. 111. Fig. 112.

Fig. 110.—Bimanual examination, small nodule high on uterus.
Fig. 111.—Bimanual examination, large nodule high on uterus.
Fig. 112.—Bimanual examination, pediculated nodule high on uterus.

3. **Shape** of the Corpus Uteri. Is it approximately pear-shaped and of regular contour, or is it distorted by myomata or other tumors (Figs. 103, 104)?

4. **Consistency** of Corpus Uteri. Is it apparently a

does it contain fluid, or are there hard nodules in it (Figs. 103, 104), or is there marked softening as in pregnancy (Figs. 105, 106, 107, 108)?

5. **Tenderness** of Corpus Uteri. Does pressure on the uterus cause pain or does the attempt to move it cause pain?

6. **Mobility** of Corpus Uteri. Can the uterus be moved freely up and down, to right and left, forward and backward, or is it fixed more or less firmly by an inflammatory exudate or by a tumor?

7. **Attachment** of Corpus Uteri. Does the uterus seem to be attached or fixed to the pelvic wall at some point? If so, where and by what?

In determining the various facts about the uterus, material assistance is given in some cases by separating the fingers laterally, as indicated in Fig. 102, or by separating them anteroposteriorly, placing one finger behind and the other in front of the cervix.

When it is impossible to reach the various parts of the uterus sufficiently to obtain the necessary information, the cervix may be caught with a tenaculum forceps and the uterus pulled somewhat downward (Fig. 100). Care should be taken, however, not to pull the uterus down very far, because of the danger of overstretching the uterosacral ligaments.

When a mass is found in the vicinity of the uterus its exact relation to the uterus is to be determined as accurately as possible, particularly whether it is a growth from the uterus or is simply lying against that organ. Figs. 109, 110, 111, 112 indicate the methods of determining how intimately a mass is attached to the uterus.

PALPATION OF LATERAL REGIONS OF PELVIS

Tubes and Ovaries, Mass, Induration, Tenderness

In this region, on each side, lies the large area of connective tissue, beside the cervix and lower part of the corpus uteri. Here induration from inflammati [illegible] ause is felt at once, low about the cervix, just under the [illegible] side the uterus, lie the fallopian tube and the ovary. [illegible] rt of the broad ligament and so close together that

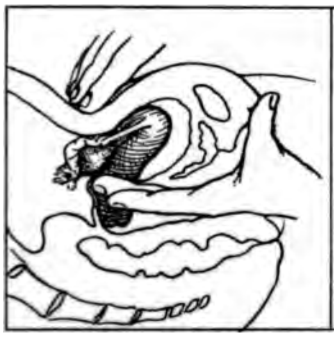


Fig. 113.

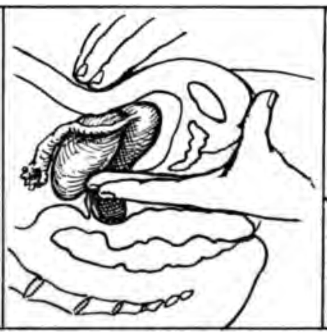


Fig. 114.

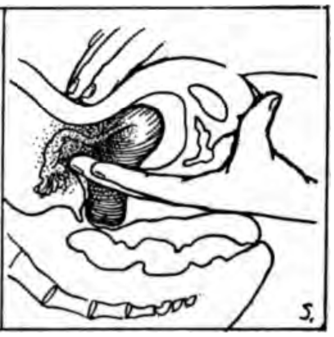


Fig. 115.

Fig. 113.—Bimanual examination, normal adnexa.
Fig. 114.—Bimanual examination, distinctly outlined adnexal mass.
Fig. 115.—Bimanual examination, adnexal induration from infiltration.

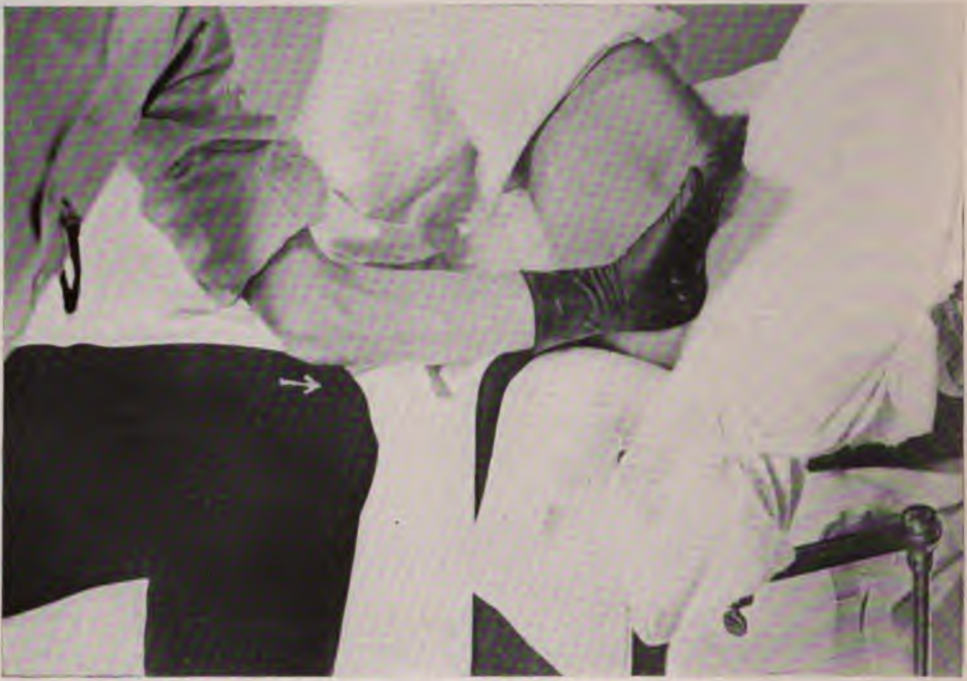


Fig. 116.—Invagination of the perineum and pelvic floor, the force being applied through the knee. The arrow indicates the direction of the force.

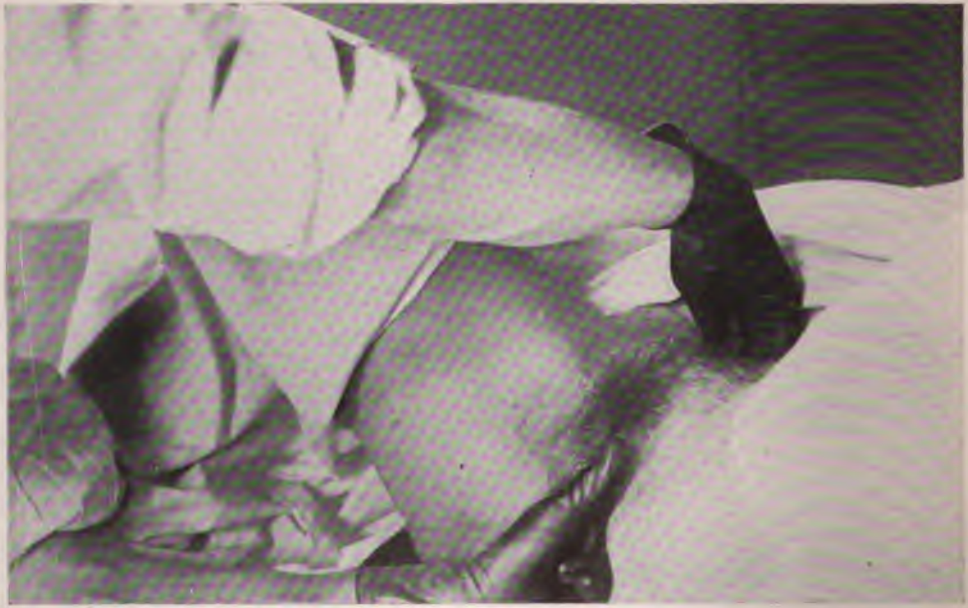


Fig. 117.—Use of this method for invaginating the pelvic floor in the deep bimanual examination.

ordinarily it is impossible to say, simply from the position of a mass there, whether it springs from the tube or from the ovary. Hence the region is spoken of as the "tubo-ovarian" region, as both organs lie there. It is also called the "adnexal" region, the tube and ovary of each side being considered the adnexa of the uterus. The method of palpating in different conditions is indicated in Figs. 113, 114, and 115. The tuboovarian region lies high and to palpate it satisfactorily requires special care.

Steps in Palpation of the Lateral Regions

In palpating the tuboovarian region of either side, proceed as follows:

1. Place the tips of the vaginal fingers to that side of the cervix, and then push them backward and outward and upward as far as possible.

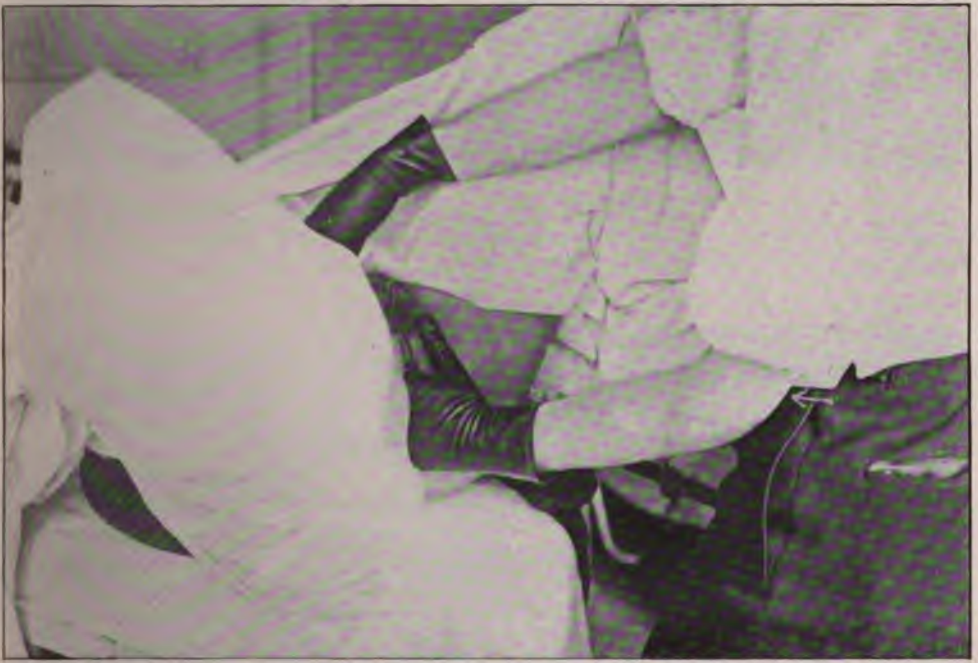


Fig. 118.—Another method of invaginating the pelvic floor. The force is transmitted through the iliac crest to the elbow as indicated by the arrow.

In order to carry the finger-tips sufficiently far into the posterior lateral area of the pelvis, it is necessary to push the perineum for some distance into the pelvis. This is best accomplished usually by utilizing the force of the body muscles, transmitted to the elbow either through the knee (Figs. 116, 117), with the foot on a small stool, or through the iliac crest (Fig. 118). This leaves the arm muscles free for the deep delicate manipulation necessary to accurate palpation of the pelvic contents.

2. With the abdominal fingers locate the anterior superior spine of the ilium on that side and then bring the fingers directly inward (not downward toward the pubes, but directly inward or slightly upward) toward the median line for about two inches (Fig. 119).

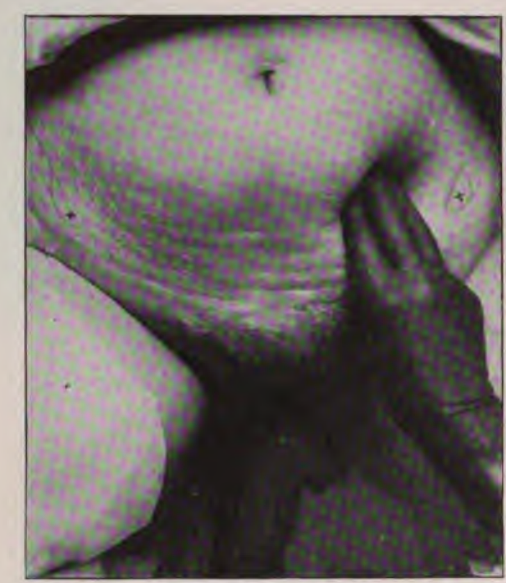


Fig. 119.—Palpation of the left lateral region. Placing the fingers of the abdominal hand. They should be on a level with, or a little above, the anterior superior spine (indicated by the cross).

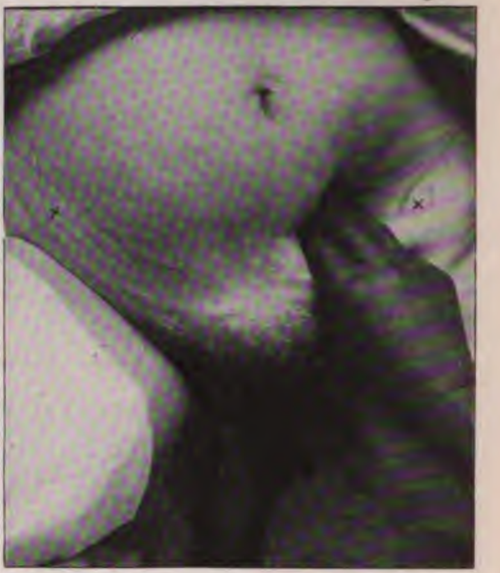


Fig. 120.—Palpation of the left lateral region. Depressing the abdominal wall deeply into the pelvis.

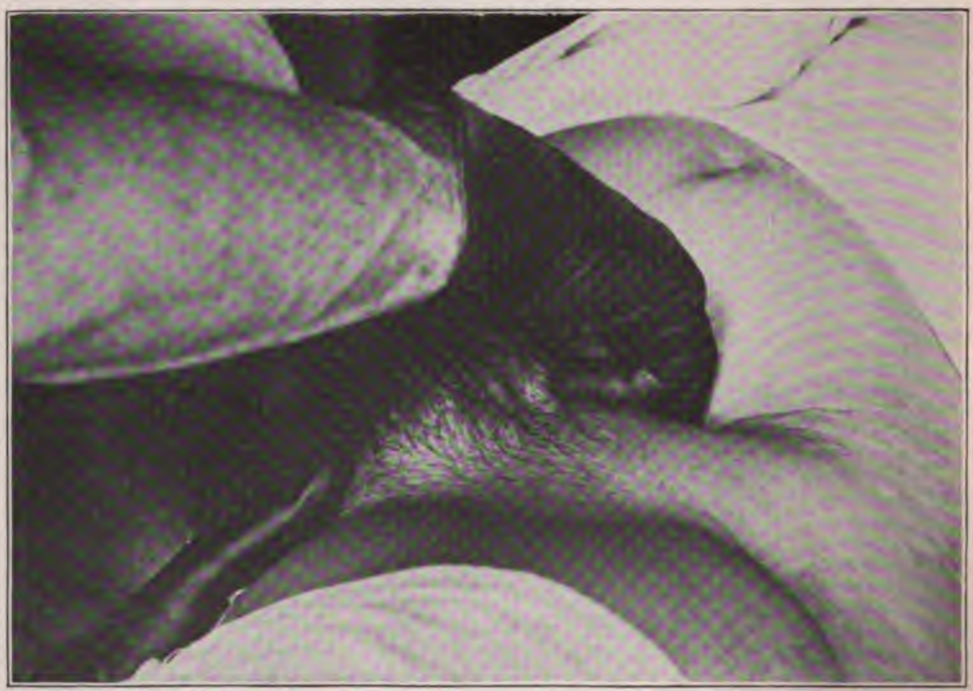


Fig. 121.—A view from another direction, showing the marked depression of the abdominal wall in deep pelvic palpation.

3. Then, at that point, depress the abdominal wall into the posterior part of the side of the pelvis (Figs. 120, 121) until the tips of the abdominal fingers come close to the tips of the vaginal fingers. This brings the fingers near to each other back of, or at least in the region of, the tube and ovary (Figs. 122, 123).

4. If the adnexa are not felt in the back part of the pelvis, then bring the fingers of the two hands, held in the same relation to each other, slowly downward toward the pubes. In this way the tube and the ovary are made to pass between the examining finger-tips and may be felt if decidedly enlarged.

By proceeding gently, so as not to excite contraction of the abdominal muscles, and at the same time steadily pressing the two sets of fingers toward each other, a little with each expiration, the finger-tips may be brought almost together in the various parts of the pelvis.

In these manipulations the palpation proper is made principally with the vaginal fingers, the abdominal fingers serving simply to push the structures down within reach of the fingers below.

A common error is to bring the tips of the examining fingers together too close to the pubes; hence the palpation is of the tissue in front of the tube and ovary, even if they are in normal position. It must be kept in mind also that the tube and ovary are likely to be displaced, especially if diseased, and the displacement is nearly always backward; hence the importance of getting far back in the side of the pelvis when endeavoring to accurately palpate these structures.

In order to avoid this error, be certain that the point of depression of the abdominal wall is well above the tuboovarian region, so that when depressed into the pelvis it will lie back of the tube and ovary.

Facts to Determine

In the exploration in the tuboovarian region take particular care to search for:

Tube and Ovary—Usually not felt if normal;

Abnormal Mass—Enlarged Tube or Ovary, Exudate, Tumor;

Induration—Inflammatory Infiltration or Exudate, Adhesions, Scar-tissue;

Tender Area—Normal Sensitiveness of Ovaries, Inflammation, Hyperesthesia, Tenderness from other cause.

Tube and Ovary.—In many cases the normal tube and ovary cannot be distinctly felt, even by the experienced examiner, and the inexperienced will find it difficult even in comparatively easy cases. When the tube or ovary is decidedly enlarged, it can be felt to slip between the examining fingers as a distinct thickening or as a small rounded mass.

After locating the adnexa, as above described, it is sometimes advantageous to try to trace the tube out from the uterus. The fundus uteri is located, the examining fingers (vaginal and abdominal making united counter-pressure) pass to the upper outer angle, and then feel for the tube as it leaves the uterus and runs along the top of the broad ligament. The best place to locate it usually, when not abnormally indurated, is just beyond the angle of the uterus. It is a much firmer cord here than farther out, where the cavity becomes large and the tube soft.

The normal fallopian tube may be felt in a suitable case (thin patient with relaxed abdominal wall and relaxed pelvic floor), in the position indicated, as a small soft cord about the size of a slate pencil. It presents very much the consistency of a piece of rubber tubing. It may, in a suitable case, be traced outward and is then lost in a region of the ampulla, where the tube becomes very soft and the ovary comes into prominence as a soft, rounded, movable body, a trifle larger than the end of the thumb and sensitive to pressure. When the tube is inflamed it becomes harder and larger, and is more easily felt. It then feels very much like a rather firm piece of rubber tubing of about the size of a lead-pencil or larger, extending outward from the angle of the uterus, with irregular curves and bendings and enlargements. From this size it may enlarge to a mass that fills all that side of the pelvis. Usually, however, when the inflammation is at all severe, adhesions or plastic exudate surround the tube and ovary, binding them and the surrounding structures together in one mass and making their separate differentiation impossible.

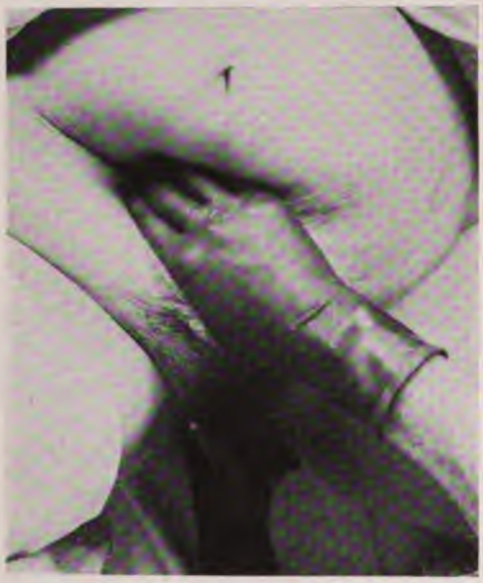


Fig. 122.—Palpating the right tubo-ovarian region. Notice how deeply the wall is depressed.

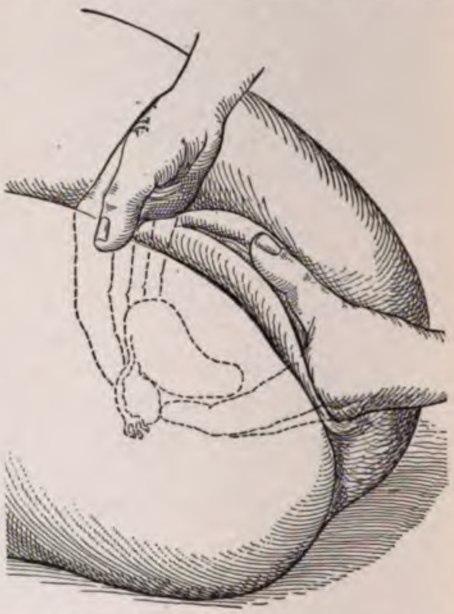


Fig. 123.—The ovary caught between the examining fingers. (Ashton—*Practice of Gynecology.*)

If on examination the pelvic tissues are all soft and yielding, and no particular pain is caused by the palpation, you may be certain that the tubes and ovaries are not seriously diseased, though you may not have felt them.

Mass in Lateral Part of Pelvis.—The pelvic tissues, with the exception of the uterus, are soft and yielding, and any firm body may be felt through them, either a tumor or an inflammatory exudate or a firm blood-clot. Fluid blood or serous exudate cannot be felt unless it is incapsulated. If a mass is found to either side of the uterus, determine concerning this mass the same facts that you did concerning the uterus—namely, its position, size, shape, consistency, tenderness, mobility and attachments. Determine particularly whether or not it is attached to the uterus, and, if so, whether by a broad attachment or by a narrow one.

Induration in the Lateral Part of Pelvis.—In some cases where there is no distinct mass felt, there is a very definite hardening of tissues at some point. Instead of the tissues being soft and pliable, and easily pushed before the examining finger, as they are normally, there is a stiffness and fixation and resistance, as though there were infiltration and thickening, and the structures beyond cannot be satisfactorily palpated. This resistance and fixation of tissue without a well-defined mass is designated by the term "induration." It may be due to infiltration (inflammatory, tuberculous, malignant) of the tissues, to inflammatory exudate on surfaces, to adhesions, to scar-tissue or to a tumor not yet developed far enough to form a distinct mass.

Tender Area in Lateral Part of Pelvis.—The ovaries are usually rather sensitive on bimanual palpation, and allowance must be made for this normal sensitiveness when estimating the diagnostic significance of tenderness in this region.

Tenderness on palpation may accompany almost any pathologic condition in the pelvis, but it is especially marked in inflammatory trouble, in peritoneal irritation from blood in the peritoneal cavity and in neuralgic affections of the pelvis.

PALPATION OF OTHER REGIONS

In the same way, as already described, careful exploration is made of the following regions:

Posterior Part of Pelvic Cavity—Mass, Induration, Tenderness.

Anterior Part of Pelvic Cavity—Mass, Induration, Tenderness.

Ureteral Regions—Mass, Induration, Tenderness.

Pelvic Nerve Trunks—Tenderness.

Lower Abdomen—Tension, Tenderness, Mass.

If a mass is found in any of these regions, determine as accurately as possible its position, size, shape, consistency, tenderness, mobility and attachments.

The method of determining whether a mass is attached to the posterior surface of the uterus, and, if so, how intimately, is shown in Fig. 124, where the sulcus between the uterus and the mass is being palpated to determine its depth. In the case of a tumor with a long pedicle, it is well to have an assistant hold the tumor up in the abdomen out of the way, while the examiner, by bimanual palpation, feels whether or not there is any connection with the uterus or appendages. Also, the uterus may be caught with a tenaculum forceps and pulled downward (Fig. 109), assisting still further in palpation. Another point is that in the case of a broad attachment to the uterus the mass and uterus move as one body, whereas with a slender attachment the two may be moved separately.

The bladder and other tissues in front of the uterus should be palpated (Fig. 92) to determine whether there is any mass or any marked tenderness.

The region of the ureter on either side is an interesting area which is usually overlooked in pelvic palpation. The ureter extends on each side from the base of the bladder backward, outward and upward, about half an inch from the cervix uteri. Ordinarily it is not felt. In a suitable case, however, it may be felt as a rather indefinite cord or line of tension, extending from the base of the bladder in the direction indicated. Fig. 125 indicates the method of palpating this region. If inflamed, the ureter is tender on pressure. If infiltrated and thickened, it is easily felt. If a stone is lodged in the lower portion of the ureter, it may be felt. In this way the author was able to determine definitely that a stone was lodged in the left ureter, a short distance from the bladder, in the case of a pregnant woman with such sudden severe pain and threatening symptoms that it was at first feared that the trouble was rupture of an extrauterine pregnancy. The patient eventually recovered and carried the child to term.

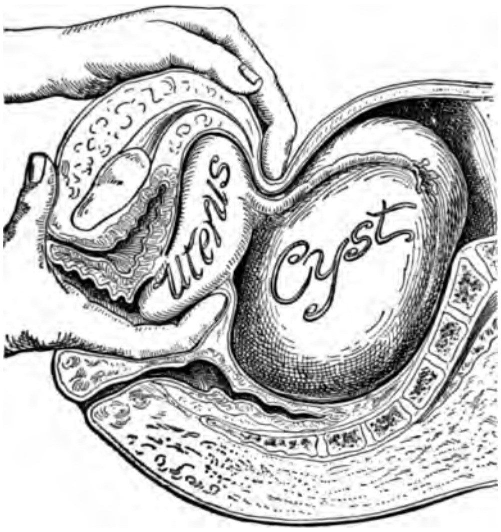


Fig. 124. Determining what attachment there is between the uterus and a mass back of it. The uterus is caught between the hands and brought forward and the examining fingers are crowded in between the uterus and the mass. (Ashton—*Practice of Gynecology*.)

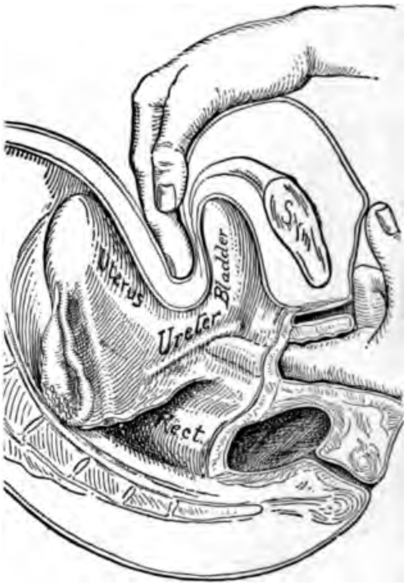


Fig. 125. Palpating the region of the right ureter. (Ashton—*Practice of Gynecology*.)

If much inflammation has taken place about a stone or an infected portion of the ureter, there may be considerable periureteral infiltration that in a measure obscures the ureter, and gives the signs simply of a cellulitis at that side of the uterus and extending toward the bladder. A cellulitis associated with persistent bladder symptoms should be carefully investigated, with the idea that it may come from the ureter. Determine whether the induration runs into the region of the ureter and whether there is tenderness farther up along the ureter or in the kidney, or whether the urine gives evidence of disease in the urinary tract. In a considerable proportion of the cases presenting persistent bladder irritability and classed as chronic cystitis, the trouble is really located in the ureter. Inflammation or tuberculosis of the lower part of the ureter gives symptoms very closely resembling chronic cystitis.

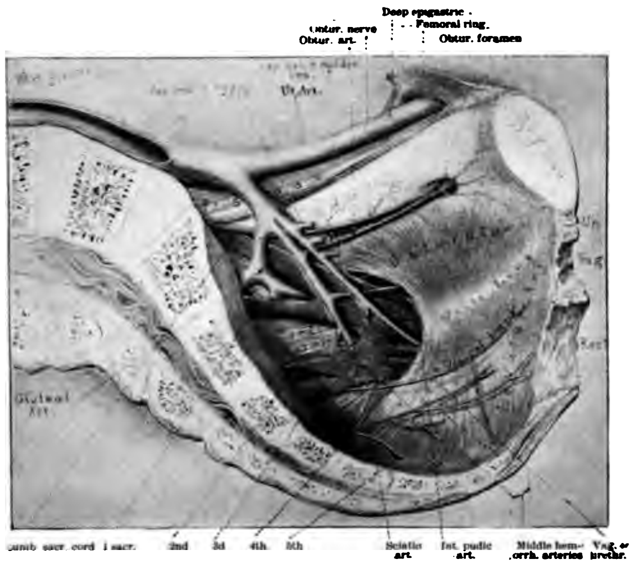


Fig. 126.—Showing the exact situation of the large nerve roots in the pelvis. In the illustration the large nerve roots appear a shade darker in color than the other structures. (Kelly—*Operative Gynecology.*)

In cases where pelvic neuralgia or neuritis is suspected, palpate the pelvic nerve trunks (Fig. 126). Sometimes the pelvic tenderness, which at first seems widespread, may be localized in its greatest intensity along the nerve trunks of one or both sides. These may be reached by deep palpation per vaginam or per rectum.

GENERAL OBSERVATIONS ON BIMANUAL EXAMINATION

It may seem hardly worth while to take the trouble to make out all these little points in regard to the uterus or a mass beside the uterus, **but it is worth while,** and the farther one advances in diagnosis the more he appreciates this fact. The ability to make a correct diagnosis in deep-seated pelvic disease depends largely on the ability to answer the above questions correctly, and until one can determine facts as above indicated, in regard to the uterus or other pelvic mass, one's diagnosis is simply a guess and not a diagnosis at all.

Importance of the Educated Touch

The author desires to emphasize the importance of **training the hands**—of **acquiring the** "tactus eruditus." The multiplication of instruments for diagnostic purposes has, to some extent, obscured the importance of the educated touch. The beginner in gynecologic work is bewildered by the great variety of specula, tenacula and other instruments for diagnosis, and he is accordingly impressed with the idea that the principal thing is to learn how to use instruments, and then to use them on every occasion. One of the first duties of a teacher in gynecology is to displace this erroneous idea by showing the importance of the use of the hands. Most of the serious diseases of women affect structures that lie beyond the reach of sight. To the teacher falls the duty of directing the student's efforts in such a way that he will acquire the ability to distinguish these intrapelvic conditions in the only way that such conditions can be distinguished, namely, by touch. After the student has, by lectures, supplemented by charts and demonstrations, been helped to form a mental picture of the normal organs—their position, size, shape, structure and relations—then comes the task of helping him to recognize such conditions by the sense of touch. This is not a matter of a few days. It takes weeks and months of patient work and many careful examinations, to be able to recognize normal conditions. The abdominal wall and the vaginal wall intervene between the examining fingers and the important organs. These intervening structures vary so much in thickness, in consistency, in tension and in sensitiveness, that there is infinite variety in the facility with which the organs may be outlined. Again, the organs themselves vary much within normal limits, in different individuals and in the same individual at different times.

The beginner must learn to read the conditions first by learning the separate letters, so to speak, and then learning what certain groupings of letters mean. The separate items that must be recognized in this examination are the **position, size, shape, consistency, tenderness, mobility** and **attachments** of the organs. This takes much time and patience and well directed efforts through many examinations. It cannot be learned from lectures. It cannot be learned by seeing someone make examinations and applications. It can be learned only through repeated bimanual examinations by the student himself, under competent instruction. Hence the importance of the clinical portion of a gynecologic course.

Though it takes considerable time to learn to recognize normal conditions, the time is well spent, for no real progress is possible without this knowledge. The **normal must be known** before the abnormal can be appreciated. This is self-evident and yet how many students at graduation, and physicians long after graduation, find it difficult to feel more than the vaginal walls and cervix.

In the recognition of pathologic conditions, the same points must be considered (position, size, shape, consistency, tenderness, mobility and attachments), and this information, supplemented by the history, determines the diagnosis. This determination of the particular pathologic conditions present is accomplished almost altogether by the hands, either in the ordinary bimanual examination or in the examination under anesthesia.

The author does not wish to minimize the value of **diagnostic instruments** (specula, sounds, curets, etc.). **They are often helpful and in some cases indis**pensable to a positive **diagnosis, and their use should not be neglected. But** he does wish to emphasize the **fact that [illegible]ologic examinations gener-**

ally, instruments are of secondary importance and only supplemental to the trained hand.

Take every opportunity to educate the fingers to appreciate as accurately as possible the various conditions found in the pelvis. When examining a suitable case, outline the uterus and all the pelvic structures as clearly as you can, even if not necessary to the diagnosis in that particular case. Each careful examination made serves to educate the fingers, or rather serves to educate the mind to appreciate what is between the fingers, and prepares you to make out the exact conditions in difficult cases.

Train One Hand

In the bimanual examination, it is well to train one hand for the vaginal manipulations. For this purpose, either the right or the left hand may be selected, as the examiner finds more convenient. The author uses the left, leaving the right free for the abdominal palpation and for the handling of instruments. The advantage of using the same hand in vaginal manipulations in practically all cases, is that the **power of discrimination** by the fingers of that hand increases as more and more examinations are made. At the same time, the abdominal hand becomes accustomed to the abdominal manipulations and as the examining hands are in practically the same relation in every case, deviations from the normal are more readily recognized and more accurately defined than if the two hands were used indiscriminately and hence in different relations. This is especially true when the examiner has the advantage of only a limited number of examinations.

In exceptional cases, it is an advantage to use first one hand and then the other for vaginal palpation. In some cases, the right side of the pelvis can be explored better with the fingers of the right hand and the left side with the fingers of the left hand.

Use Two Fingers

Use two fingers in the vagina when the vaginal opening is large enough to permit their use without pain. A **deeper and more accurate** examination can be made with two fingers (index and middle finger) than with the index finger alone. The upper part of the vagina is capacious. The only difficulty is at the vaginal entrance. By lubricating the fingers well, and depressing the perineum and working carefully, the two fingers may be used without discomfort in practically all parous women, and in most nonparous women who have been married.

Examine Deeply in Pelvis

In many cases, in order to palpate the posterior part of the pelvis and particularly to satisfactorily palpate the tuboovarian regions, the vaginal fingers must reach farther than their length will permit. The extra reach is secured **by carrying the perineum into the pelvis** (invagination of the pelvic floor) by **teady pressure** inward. The soft structures closing the pelvic outlet **ried for a** considerable distance inward without particular discomfort to the patient, provided all the muscles are relaxed. In parous women, from one to two inches may usually be thus added to the effective length of the examining fingers.

The force required, while not great, is likely, if exerted by the arm muscles alone, to interfere with delicate palpation by the examining fingers. It adds much to the effectiveness of the examination to exert this pressure by the body muscles, leaving the arm muscles free for the internal palpation movements. This may be accomplished either by placing the left foot (when examining with the left hand) on a stool or chair-round and resting the elbow on the knee (Figs. 116, 117), or by letting the elbow rest against the hip (Fig. 118).

May Draw the Uterus Down

It is advantageous in the bimanual examination in some cases, to catch the cervix with the tenaculum forceps and draw the uterus downward, so that the examining fingers may reach higher on its posterior surface (Fig. 100). This is useful in those cases where the uterus lies so far back in the pelvis that it is difficult to reach. After making the vaginoabdominal examination in the usual way, the tenaculum may then be introduced by touch and the cervix caught and brought down.

Only light traction should be made—not enough to unduly stretch the sacrouterine ligaments, which might lead to subsequent trouble. The author desires to protest against the statement made by some authorities to the effect that the normal uterus may with impunity be pulled down until the cervix appears at the vaginal opening, or may without harm be turned into extreme retroversion, for the purpose of palpating the posterior surface or even hooking a finger in the rectum over the fundus and palpating the anterior surface. The uterus is usually movable in all directions, but the movements here mentioned are far beyond the normal range and can be accomplished only by undue stretching of the structures intended to prevent such displacements.

Of course, when the pelvic structures are already overstretched and lax, as in cases of laceration of the pelvic floor with descent of the uterus or in cases of movable retrodisplacement, these extreme maneuvers may be carried out without further damage, and, in doubtful cases, with great advantage in regard to accuracy of diagnosis. In a patient with practically normal uterine supports, however, the pulling down of the uterus or the backward displacement of the uterus for diagnostic purposes or for therapeutic purposes (as in curettage or repair of cervix), **should be of very limited extent.** It is easy to overstretch the uterine supports but it is not so easy to restore tone to these structures so that they will again hold the uterus in just the right way. This is particularly important in regard to the postcervical supports (sacro-uterine ligaments and adjacent tissues) which are stretched every time the cervix is pulled downward. When these are once overstretched and rendered lax, it is practically impossible to keep the uterus permanently in proper position except by operation.

Preferable Position for Examiner

For the vaginal and bimanual examinations, it is decidedly advantageous for the examiner to stand directly **in front** of the vaginal opening, as shown in Figs. 117 and 118. This is especially important when very deep pelvic palpation is necessary. This is the usual position when the patient is examined on the table with footrests so that the hips may be brought entirely to the end of the table.

When a patient is examined in bed, however, the usual directions are to pass the examining arm under one thigh. This puts the examining arm and hand at a decided disadvantage. The examiner should sit so that the examining arm passes **between the thighs** as shown in Fig. 181. This puts the arm directly in front of the genitals, the same as in the examination on the table. This brings the arm and hand in the most advantageous position for accurate palpation deep in the pelvis, as the reader can easily demonstrate to his own satisfaction by giving a trial to each method in some difficult case requiring deep palpation.

Conditions in Different Patients

The facility with which the bimanual examination can be made varies much in different patients. In some, the fingers on entering the vagina are checked by the strong contraction of the muscles of the pelvic floor. When such is the case, turn the palmar surface of the examining fingers backward and make steady pressure against the posterior vaginal wall and the contracting muscles. This gives you an idea of the strength of the muscles of the pelvic floor and soon, under the pressure, the muscles relax. Another troublesome obstacle to deep bimanual examination is tension of the abdominal wall. The methods of overcoming this have already been explained.

In a thin patient, with a large vagina and a relaxed abdominal wall, the uterus can be outlined and the appendages felt, and any abnormal mass, even a small one, can be satisfactorily palpated.

In a stout patient, with a thick layer of fat over the abdomen, the ordinary bimanual examination is often unsatisfactory, particularly if there is inflammatory trouble with tension of the abdominal wall. In such a case, a mass of considerable size, if situated high in the pelvis, may be missed entirely. The only way to determine exactly the pelvic contents in such a case is to make an examination under anesthesia. Such an examination should be made in those cases where the symptoms are urgent enough to make an immediate accurate diagnosis necessary.

Get Intestines Out of the Way

In some cases, particularly when there is considerable tympanites, distended coils of intestine interfere with the bimanual palpation of the pelvic structures.

To overcome this difficulty, **elevate the patient's hips** into the Trendelenburg posture. Then work the intestines out of the pelvis and hold them out as the hips are slowly lowered into a more comfortable position. Leave the hips rather high, as high as the patient will stand without discomfort, and direct her to keep all the muscles loose and breathe quietly, so as not to force the intestinal coils back into the pelvis. The regular bimanual palpation may then be carried out, undisturbed by the troublesome intestinal coils.

This is a very convenient maneuver also for getting a pediculated tumor out of the pelvis, that its pedicle and point of origin may be accurately determined by bimanual palpation.

In case the table is not arranged for the convenient elevation of the hips, the hips may be elevated by means of pillows or the patient may be placed in the **knee-chest posture** for a few moments. With the clothing well loosened and the correct knee-chest posture assumed, the distended intestinal coils fall out of the pelvis better than in the Trendelenburg posture, but in the exertion of assuming the dorsal posture again they are likely to be partially forced back. Avoid this as much as possible by directing the patient to keep the upper part of the body on the table (not to raise it, as in partly sitting up) and to keep the abdominal muscles loose. Also place a thick pillow under the hips, as the dorsal posture is assumed. An additional expedient is to put a speculum in the vagina and in the rectum while the patient is in the knee-chest posture. The vagina and rectum then balloon with air, forcing the intestinal coils out of the pelvis. The specula are then removed and the openings close, retaining the air which helps to keep the intestinal coils out of the pelvis in the subsequent movements.

Diminish Tenderness

In many patients satisfactory pelvic exploration is prevented by tenderness, particularly in that large class of cases in which pelvic inflammation is a primary or complicating lesion. In some of these cases the symptoms are so urgent that an examination under anesthesia at once is advisable. In most of the cases, however, the symptoms are not so threatening as to necessitate immediate examination under anesthesia. The patient has come for a diagnosis but an accurate diagnosis cannot be made because of the tenderness which prevents deep palpation. What shall the examiner do under these circumstances? There are two measures which are useful in diminishing the tenderness and abdominal tension.

1. Administration of a sedative. The patient may be given 1 gr. of codeine phosphate hypodermatically, or 1/6 gr. or 1/4 gr. of morphia, and examined again after half an hour.

If thought preferable, an appointment may be made for the next day and an order given for the sedative to be taken by mouth one hour before your visit. In the meantime the patient is kept quiet in bed and the bowels well opened. It is well to have an enema given half an hour before examination.

2. Treatment for the inflammation. The patient is kept in bed, the bowels well opened, hot vaginal douches given and the regular treatment for acute or subacute pelvic inflammation carried out. This treatment continued for a few days or a week will do much toward diminishing the tenderness, so that a thorough pelvic examination may be made.

INSTRUMENTAL EXAMINATION

This term includes those manipulations in which it is necessary to use instruments. Coming under this classification are the following:

Inspection of Vagina and Cervix through the Speculum (Speculum Examination).
Excision of Tissue from Cervix for Microscopic Examination.
Exploration of Interior of Uterus with the Sound.
Exploration of Interior of Uterus with the Curet.

SPECULUM EXAMINATION

By means of certain instruments the vaginal walls may be spread apart so that those walls and the cervix uteri may be seen. Information of much value in some cases may be obtained in this way.

Instruments for Regular Speculum Examination

The instruments needed for this examination are shown in Fig. 127. They are as follows:

A Speculum for separating the vaginal walls;
A long Dressing Forceps for sponging out the vagina, usually called "Uterine Dressing Forceps;"
A Tenaculum Forceps, or "Volsellum," for catching the cervix and bringing it better into view.
A Specimen Scissors.

Vaginal Speculum.—The **bivalve speculum** (Fig. 127, a) is the kind most frequently used in ordinary office work. It consists of two blades, which are introduced closed and then opened by a mechanism at the handle. The vaginal walls are thus held apart (Fig. 130) and a very good view of the walls and cervix may be obtained. The bivalve speculum is convenient and gives good exposure of the cervix in most cases.

There are many different modifications of the blades and also of the mechanism for separating the blades. The most satisfactory form that the author has found is shown in the illustration. It is called the Graves speculum and has the advantage that it can be easily and quickly transformed into a fairly satisfactory Sims' speculum, which is a decided convenience in office work. **Three sizes** are useful—small (virgin), medium and large. The cervix is easier exposed in most cases if the anterior blade of the speculum is somewhat shorter than the posterior.

Some specula are made with three blades, instead of two, constituting a trivalve speculum. They are made on the same general principles as the bivalve but the mechanism is more complicated and, usually, without corresponding benefit.

The bivalve speculum is used with the patient in the dorsal posture (Figs. 53, 130). For sterilization of specula and other instruments, see Preparations for Examination, at the end of this chapter.

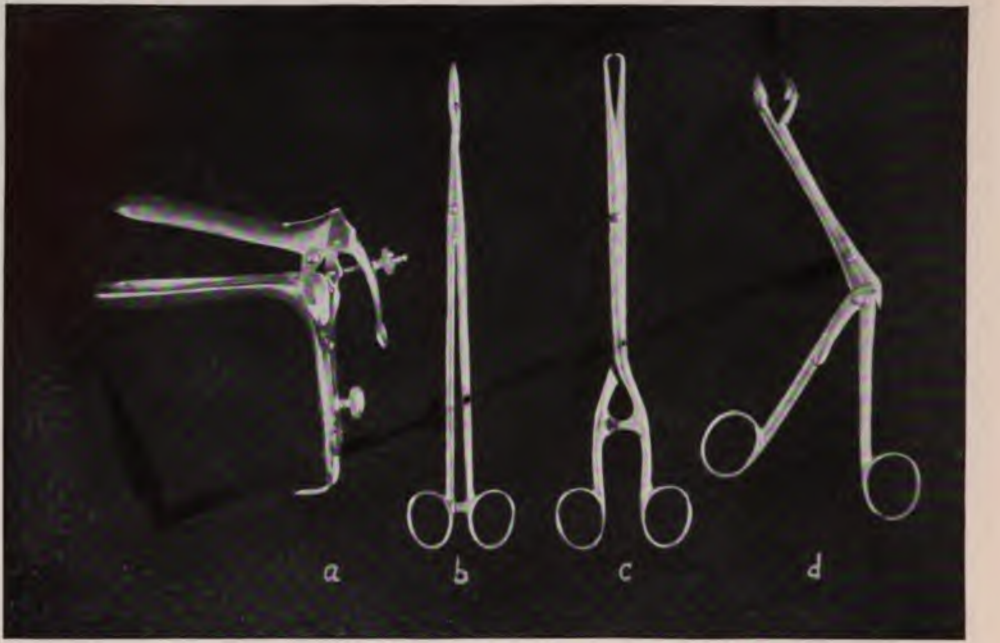


Fig. 127.—Instruments for the regular speculum examination. *a.* Bivalve speculum, of which it is well to have three sizes—large, medium, and small. *b.* Dressing forceps for swabbing out vagina. *c.* Tenaculum forceps for catching cervix to bring it well into view. *d.* Specimen scissors, a small strong hawk-bill scissors for clipping small specimens from the cervix in suspicious cases.

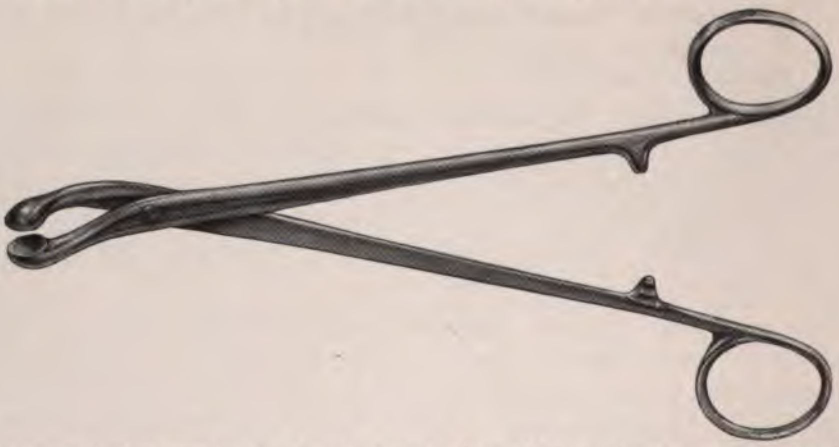


Fig. 128.—Gaylor's scissors for the removal of pieces of cervical tissue for microscopic examination.

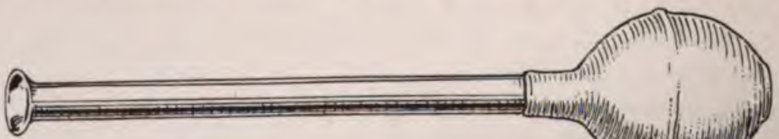


Fig. 129.—Suction bulb and tube for removing cervical mucus when in large amount.

The **Uterine Dressing Forceps** (Fig. 127, b) is a long strong forceps for sponging out the vagina and for making vaginal applications. It may be straight or curved as preferred. The author finds the forceps w shank and a slight curve near the end more convenient than the much curved instrument. A vaginal depressor for pushing the vaginal wall out of the way is usually mentioned in an examining set, but it is generally not necessary, as the vaginal wall may be pushed aside sufficiently with the dressing forceps.

The **Uterine Tenaculum Forceps** is needed for catching the cervix and bringing all parts of it into view. It should be light but strong, especially about the lock, where it is likely to work loose (Fig. 127, c).

The **Specimen Scissors** are for clipping out a small piece of tissue from the cervix, in cases presenting an appearance suspicious of malignant disease. The one shown in Fig. 127 d, the author has found very convenient. It presents at the end of a small sharp "hawk-bill" which cuts through the firmest tissue, clipping out a small piece with but little pain or bleeding. The author appropriated it from the throat specialist's armamentarium, where it is catalogued as the Miles tonsil punch. Another satisfactory instrument for this purpose is the Gaylor specimen scissors shown in Fig. 128. Where there is a very free mucous discharge in the cervix it may be removed by the suction bulb and stem (Fig. 129).

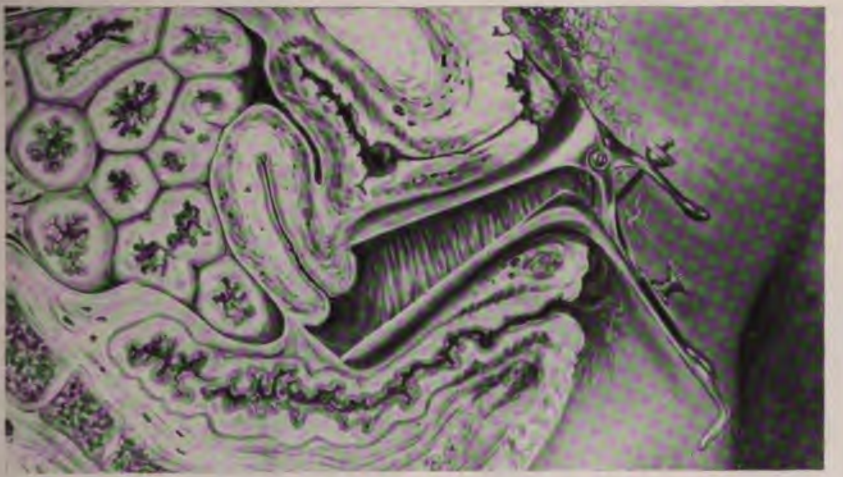


Fig. 130.—Bivalve speculum in place. Sectional view, showing relations of speculum and exposure of the cervix and vaginal vault by opening the blades.

Steps in the Regular Speculum Examination

Introducing the Speculum.—The blades of the speculum are closed and the outer surfaces lubricated and the speculum held in the right hand, while with the other hand the labia are separated and the perineum depressed somewhat with one finger (Fig. 131). The speculum is then introduced and carried all the way to the upper end of the vagina without being opened. In most cases the speculum passes the vaginal entrance most easily when held with its width almost vertical, the edge being held just far enough to one side to **miss the urethra** (Fig. 132). When well within the vagina, it is turned transversely and carried in as far as it will go (Fig. 133).

'are is necessary that painful pressure be not made on the urethra or

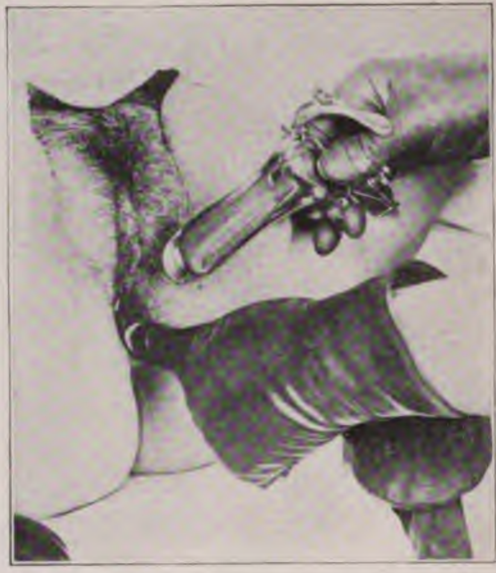


Fig. 131.—Introducing the bivalve speculum. First step—depressing the perineum to give room for the speculum to be introduced.

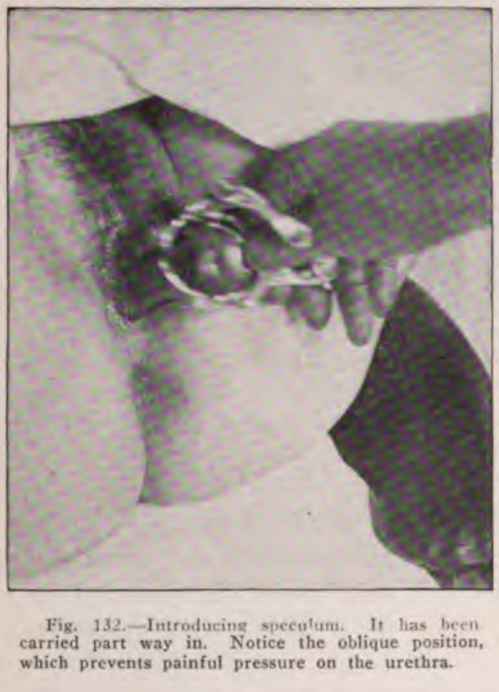


Fig. 132.—Introducing speculum. It has been carried part way in. Notice the oblique position, which prevents painful pressure on the urethra.

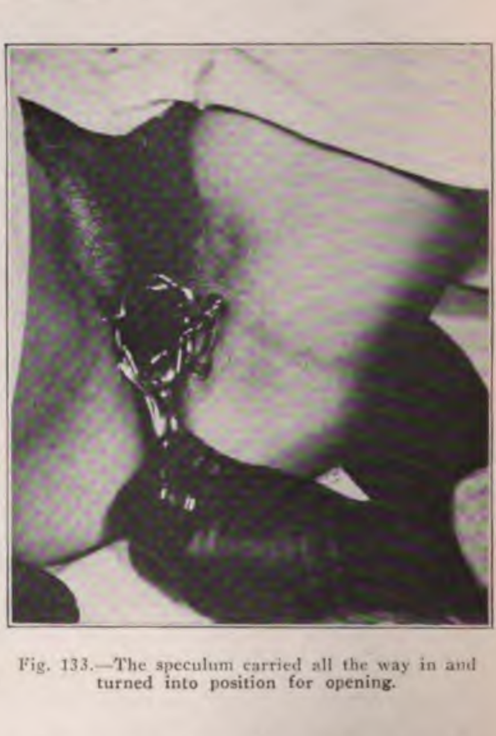


Fig. 133.—The speculum carried all the way in and turned into position for opening.

other structures beneath the pubic arch. Remember that when more room is required, the pressure must always be directed **against the perineum,** which will gradually yield.

Another common mistake with the inexperienced is to open the blades too soon, before the speculum has been introduced all the way. The blades are not in far enough to satisfactorily expose the cervix and in closing them again for further introduction, pain is likely to be produced by pinching the vaginal wall.

Exposing the Cervix.—After the blades have been introduced well up to the top of the vagina, they are opened and the cervix and vaginal walls exposed (Fig. 130). By turning the speculum in various directions, all parts of the cervix and upper end of the vagina may be seen. If the cervix does not come well into view it may be caught with a tenaculum forceps and brought downward somewhat and turned from side to side, exposing all portions of it and of the vaginal vault.

Cleansing the Vagina.—If there is secretion obscuring any part of the vaginal wall or cervix, wipe it away with cotton held in the dressing forceps.

Exposing Lower Portion of Vaginal Walls.—To inspect the middle and lower portions of the vaginal walls, turn the speculum so as to bring the various portions of the walls opposite the opening between the blades. Another way is to inspect the various portions of the walls just beyond the end of the speculum, as it is withdrawn. Specula with skeleton blades are made, but they are not necessary and ordinarily they are likely to prove unsatisfactory in a good many cases because of the prolapsing of the redundant vaginal walls through the large openings.

Information Obtained in the Speculum Examination

The information sought in the speculum examination is obtained by inspection of the following structures:

Vaginal Walls—Color, Discharge, Redundancy;
Cervix Uteri—Position, Color, Size and Shape, Lacerations, Deviation of Axis, Eversion, Erosion, Hypertrophy, Cystic Change, Ulcer;
External Os—Size and Shape, Color of Edges, Discharge, Polypi.

Vaginal Walls.—Are the walls of normal color or is there congestion? If congestion, is it active or passive? If the walls are bright red, that means active or arterial congestion and is due to inflammation or irritation. If the walls have a bluish tinge, that means passive or venous congestion and indicates either pregnancy or some interference with the circulation, as by a pelvic tumor or exudate or by failure in compensation in heart disease.

If there is discharge, determine whether it originates in the vagina or in the uterus. If the vaginal walls are lax and redundant, they tend to collapse about the speculum.

Cervix Uteri.—Is the cervix in low position, so that it is easily exposed when the speculum is in but a short distance, or is it higher than normal, so that it cannot be well exposed with the speculum of ordinary length? Is the color normal or is there congestion, either active or passive? Here, as in the vaginal wall, active congestion means inflammation or irritation and passive congestion indicates either pregnancy or obstruction of the circulation. A bright red area extending a considerable distance out from the os, is usually due to the peculiar condition called "erosion."

In regard to the size and shape, inspection may show the cervix to be:

Normal.
Long Conical.
Lacerated, but largely united again.
Lacerated and not united, but without complications.
Lacerated and everted, eroded, hypertrophied, or with cystic change or with a genuine ulcer.

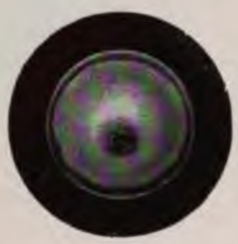


Fig. 134.

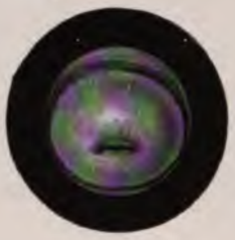


Fig. 135.

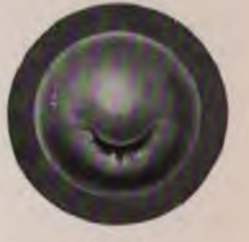


Fig. 136.

Figs. 134 and 135.—Varieties of normal cervix in the virgin. Fig. 136, Cervix of multipara. (Norris, after Heitzmann—*American Text-book of Obstetrics.*)

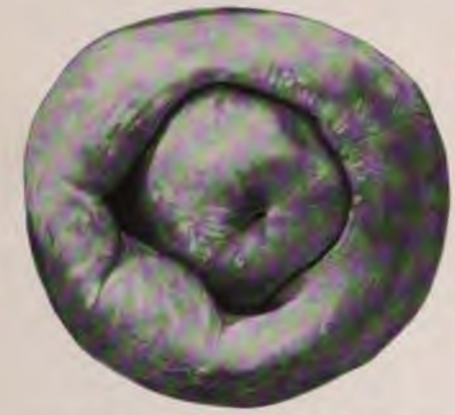


Fig. 137.—A senile cervix, with upper part of vagina. (Edgar—*Practice of Obstetrics.*)

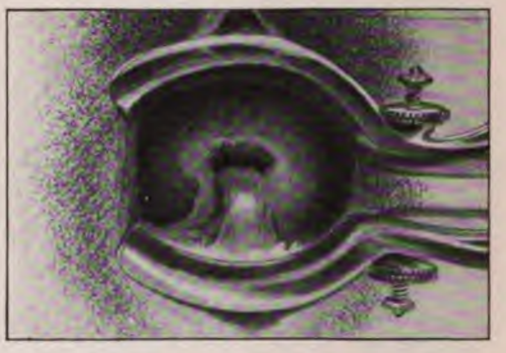


Fig. 138.—Discharge from the cervix uteri, as seen through the speculum. (Massey—*Conservative Gynecology.*)

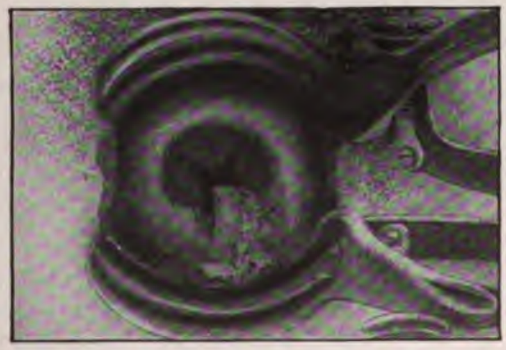


Fig. 139.—Discharge, with laceration and erosion of the cervix. (Massey—*Conservative Gynecology.*)

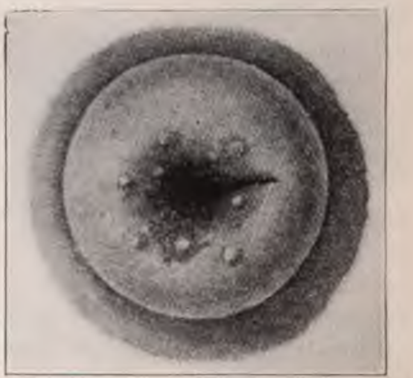


Fig. 140.—Erosion of the cervix, with a few scattered cysts. (H. MacNaughton-Jones—*Diseases of Women.*)

Is the axis of the cervix directed ACROSS the vagina, as it should be normally, or ALONG the vagina, as in retrodisplacement of uterus or anteflexion of cervix?

External Os.—The size and shape show whether or not there has been laceration and consequently are of considerable medico-legal importance in certain cases, because furnishing strong evidence for or against a previous childbirth. The color of the edges show whether they are normal or the seat of inflammation or erosion.

Different appearances of the normal nonparous cervix are shown in Figs. 134 and 135, while that of the normal parous cervix is shown in Fig. 136. Fig. 137 shows a senile cervix. Fig. 138 shows endocervicitis with free discharge of tenacious mucus. The cervix in Fig. 139 shows laceration and erosion, in addition to discharge. Laceration, erosion and cystic change are shown in Fig. 140.

The discharge may be of any of the varieties previously described. There is normally a clear sticky tenacious mucus in the cervix and about the external os. The first effect of inflammation and irritation is to make this more abundant and later it becomes mixed with pus. As long as the cervical inflammation is a prominent part of the process, the tenacious, stringy quality will be a prominent feature of the discharge. If there is the least suspicion of gonorrhea, make a spread of the discharge for microscopic examination. In exceptional cases it may be advisable to use a tampon to determine the amount of discharge and whether it comes from the uterus or vaginal wall. A Schultze tampon (Fig. 234, a) or an ordinary tampon (Fig. 233, b) is introduced. The patient is directed to report at the office after a specified number of hours, when the tampon is carefully removed and examined as to the amount and location of discharge upon it. With the suction bulb and tube (Fig. 129) discharge lying in the uterine canal may be withdrawn for diagnostic or therapeutic purpose. Occasionally a small polypus will be seen presenting at the external os or hanging by a pedicle.

Difficulties in the Speculum Examination

Poor Light.—If the light is so poor that the cervix and upper portion of the vagina cannot be seen, the ordinary head mirror, used in throat work, is of much assistance. At night, in emergency examinations and treatment, the light from a lamp may, with the head mirror, be thrown into the vagina and the landmarks easily seen.

Painful Abrasions.—If there are painful abrasions or fissures about the vaginal orifice which interfere with the examination, the sensitiveness may be diminished by the application of a small piece of absorbent cotton soaked in a 10% cocaine solution. Leave this in place for three to five minutes, then remove it and proceed with the examination.

Redundant Vaginal Walls.—When the vaginal walls are very lax and redundant, as sometimes occurs because of subinvolution following labor, they collapse about the speculum in such a way as to hide the cervix. This difficulty may in some cases be overcome by using a longer speculum. When this does not expose the cervix satisfactorily, put the patient in Sims' posture and use the Sims speculum.

Examination with Cylindrical Speculum

The cylindrical speculum consists simply of a tube with the outer end flaring and the inner end cut obliquely. It may be made of metal or hard rubber or glass. The cylindrical speculum is useful in certain forms of treatment, particularly when it is desired to apply to the cervix, medicines from which the vaginal walls should be protected, but it is not much used in examination work.

When in the examination of a girl it is necessary to inspect the cervix, this may be accomplished without disturbing the hymen by placing the patient in the knee-chest posture and using one of Kelly's cystoscopic tubes. This is simply a small cylindrical speculum and, with the patient in the knee-chest posture, when the tube is introduced the vagina balloons out to some extent with air. Then by means of a light reflected from a head mirror, the cervix and vaginal walls may be inspected and if necessary treated. Such an examination, however, is seldom required. In the virgin, a local examination should not be made except for urgent symptoms, and in cases with urgent symptoms the requirement is usually for a thorough bimanual examination under anesthesia, rather than for a speculum examination.

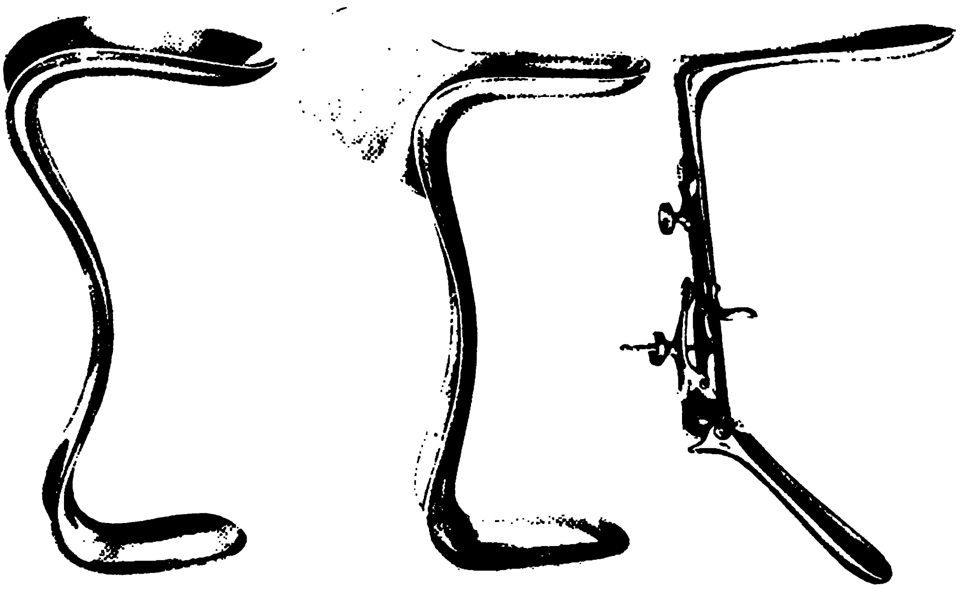


Fig. 141.—*A*. Sims' speculum, two blades of different sizes attached to one handle; *B*. Flange attached to one blade to hold back buttocks; *C*. Graves' bivalve speculum changed to the Sims type.

Examination with the Sims Speculum

The Sims speculum is a perineal retractor and for use requires the patient to be put in the Sims posture. Like any other retractor, it must be held in place either by an assistant or by a mechanism (speculum holder), of which there are several varieties.

The **Sims speculum** consists of a blade, somewhat resembling a duck's bill, and a handle. As usually made two blades are placed on one handle, a large blade at one end and a small blade at the other (Fig. 141, a). A further improvement is a flange near the larger blade (Fig. 141, b). This flange holds the fleshy part of the right buttock up out of the way. The Graves bivalve speculum, mentioned above, is easily and quickly changed into a satisfactory Sims speculum (Fig. 141, c), so it is not usually necessary to get a special Sims speculum.

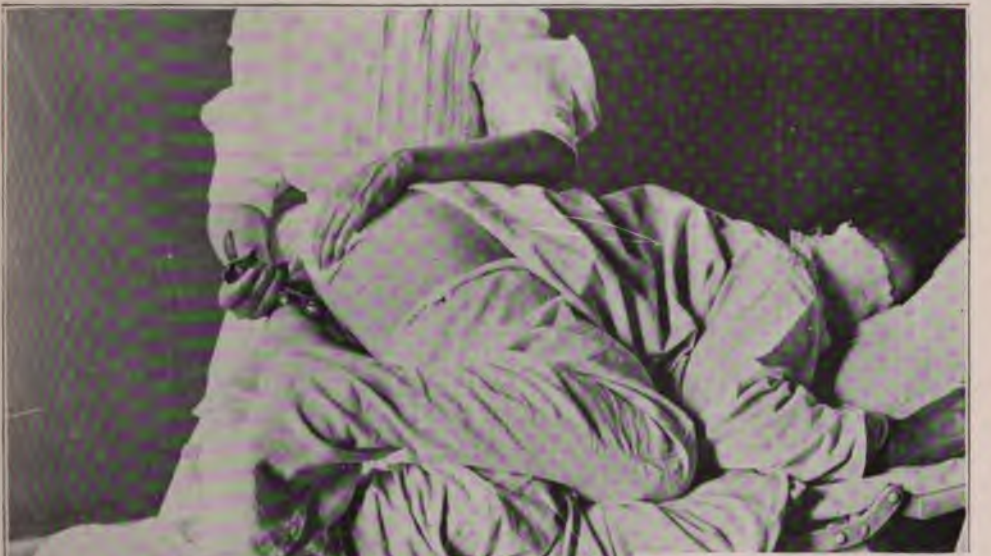


Fig. 142.—Patient in Sims' posture. Notice how the upper knee drops over the under one.

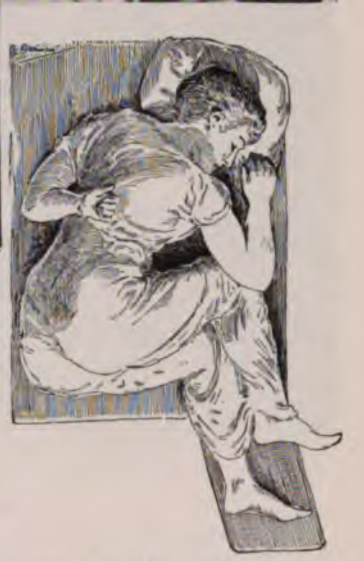


Fig. 143.—View from above, showing the arm behind the patient. (Dickinson—*American Textbook of Obstetrics.*)

The Sims Posture. The principal points about the Sims posture, called also "left lateral posture" and the "semiprone posture," are as follows:

1. All constriction must be removed from around the waist.

2. The patient lies on her left side, with left arm and hand behind her and the front of the chest turned toward the table as far as possible without

discomfort. When in proper position, the upper part of the body rests on the left breast.

3. The hips rest near the lower left corner of the table and the body extends diagonally across the table toward the right side.

4. The left thigh is drawn up so that it forms an acute angle with the body, and the right thigh is drawn up still more, and allowed to drop over the lower one. This puts the patient in the position shown in Figs. 142 and 143. It permits the abdominal wall and the intestines and uterus to fall forward.

Use of Sims' Speculum.—To introduce the speculum, the right labia are raised thus exposing the vaginal opening and then the speculum point, well lubricated, is carefully worked into the opening. At the same time, the perineum is pulled somewhat backward with the speculum point, in order to give more room for the point to slip in (Fig. 144). The blade is then carried all the way in. The speculum is then grasped firmly and pulled backward, thus retracting the perineum and exposing the interior of the vagina (Fig. 145).

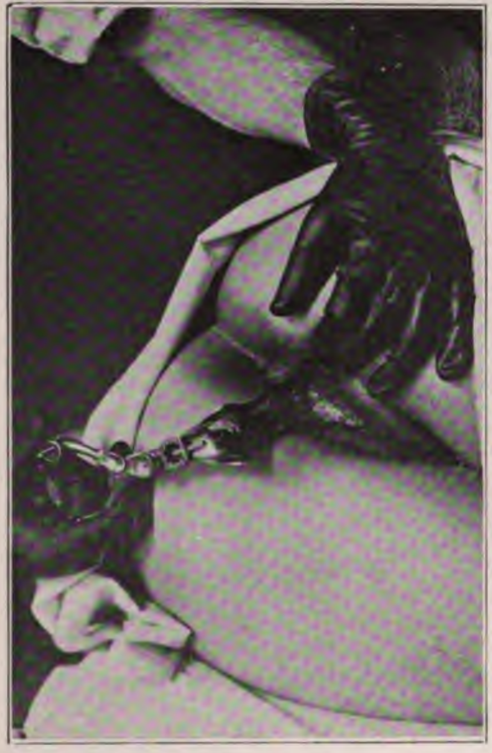


Fig. 144.—Introducing the Sims speculum.

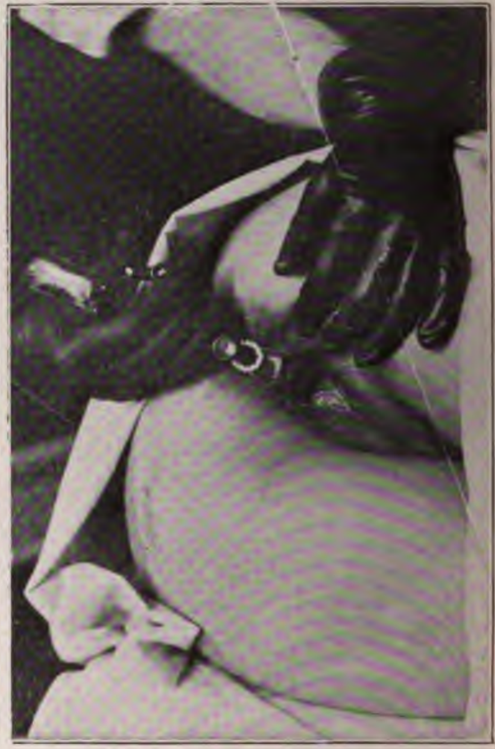


Fig. 145.—Speculum in place, and showing also the method of holding the same and of keeping the upper buttock out of the way.

As the speculum is introduced the vagina becomes distended with air, and when the perineum is retracted the cervix and anterior vaginal wall may be seen. To bring the cervix into still better view, catch it with the tenaculum forceps and bring it slightly toward the opening (Fig. 146).

When Indicated.—The Sims speculum with the Sims posture is of decided advantage in the following conditions:

1. When the bivalve speculum fails to satisfactorily expose the cervix. This may be due to the vaginal walls being so lax that they fall about the blades and obscure the cervix or it may be due to the vaginal opening being so small that the blades cannot be sufficiently separated. Again, in some cases of inflammation of the uterus or about the uterus, the bivalve speculum cannot be opened sufficiently because the anterior blade causes pain by pressure on the inflamed structures.

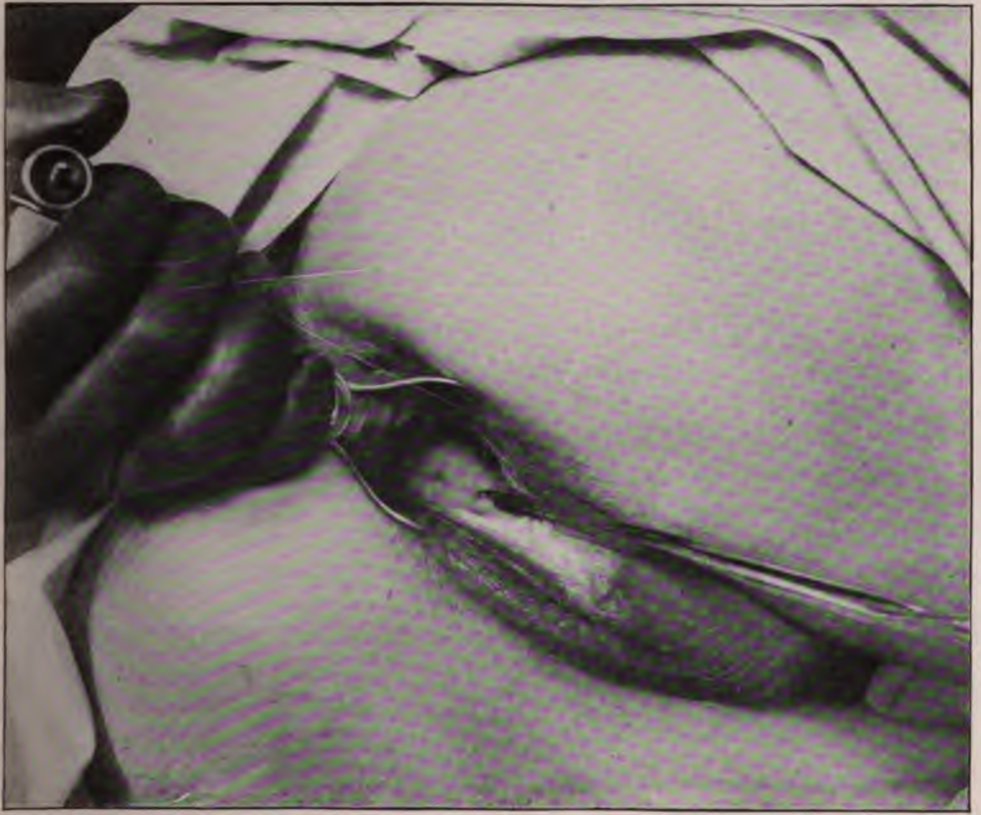


Fig. 146.—Cervix caught with tenaculum forceps and brought into view.

2. When it is desired to expose a lacerated cervix without spreading the lips apart. The bivalve speculum, as it is opened, separates the lips of the lacerated cervix, causing considerable distortion and making it rather hard to judge of the amount of eversion ordinarily present. Again, the weight of the uterus pushes the cervix into the vagina, in some cases making the cervix appear longer than it really is. In this way the bivalve speculum may lead to an erroneous diagnosis of elongation of the cervix.

3. When it is desired to expose the cervix with the least possible stretching

of the vaginal opening. The vaginal opening may be so tender that the bivalve speculum cannot be satisfactorily opened. Again, in removing cervical sutures after simultaneous repair of both cervix and perineum, it is important to avoid stretching the newly healed perineum. In these cases, a narrow Sims speculum introduced in the Sims posture, causes the vagina to balloon and exposes the cervix and vaginal vault with much less stretching of the vaginal orifice than would be necessary with the bivalve speculum.

4. When it is desired to sound the uterus or to dilate the cervical canal or to make an intrauterine application.

5. When the vagina is to be packed, either for holding the uterus forward or for hemorrhage.

7. When treating a sinus or abscess opening in the posterior vaginal fornix. When making the incision back of the cervix for pelvic abscess, the dorsal posture is the better one, as the cervix may be held out of the way by strong traction, but in the after-care of the case, the Sims posture is usually preferable. It causes the patient less pain and gives much better exposure of the opening back of the cervix.

EXCISION OF TISSUE

From Cervix for Microscopic Examination

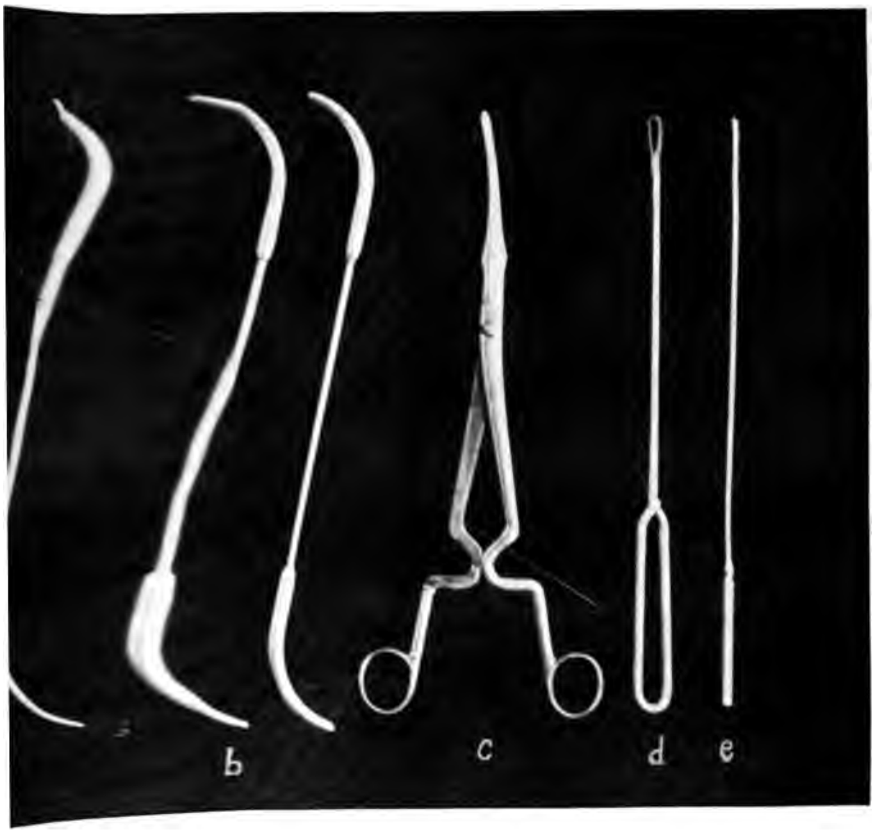
In many cases the naked-eye examination of the cervix is not sufficient to make a positive diagnosis between malignant disease and certain other affections of the cervix. In a suspicious case, particularly one that resists treatment, a small piece of the affected area should be excised for microscopic examination. A very convenient instrument for this purpose is the specimen scissors shown in Fig. 128. With this a small piece of the suspicious tissue may be clipped out of the cervix. If there is much bleeding, a suture may be placed under the bleeding surface and tied. Usually, however, a styptic application, with a firm vaginal packing, will stop the bleeding. The specimen excised from the cervix and also all the curettings should at once be placed in a small bottle of alcohol (95%) or formol (10%) and forwarded to the pathologist.

EXPLORATION OF UTERUS WITH SOUND

Through the speculum the interior of the uterus may be explored with the uterine sound. The uterine sound (Fig. 147, a) is pliable so that it may be bent to accommodate it to the uterine canal in different cases. It is graduated so that the exact depth of the canal may be told. It has a bulbous end so that there will be less danger of its puncturing the uterine wall.

Introduction of Uterine Sound

The sound should not be introduced by touch, as was formerly the custom and as is shown even in some recent textbooks, for when used in that way it is very liable to carry infection into the uterus. Before sounding, the speculum should be introduced, the cervix exposed and caught with a tenaculum forceps and the cervix and vicinity cleansed with a reliable antiseptic solution. Then sound is introduced into the uterus without touching the vaginal ore introducing the sound, the approximate location of the fundus l be determined by bimanual examination and the sound should be guided accordingly. The sound can usually be most conveniently vith the patient in the Sims posture and the cervix exposed with culum. After the sound is sterilized **do not touch** the intrauterine the fingers. If the end requires bending, dip a piece of absorbent eliable antiseptic solution and grasp the uterine portion of the is for bending. **No force** should be used in the introduction of



—Instruments for exploring the interior of the uterus. *a*. Uterine sound. *b*. Three al dilators for enlarging the cervical canal. *c*. Small branched dilator. *d*. Small ex- *e*. Intrauterine applicator.

other than is necessary to overcome a very slight stenosis. If the es not pass easily in the supposed direction of the canal, withdraw it and try in other directions. If it does not then pass easily or if it uch pain it should not be used further.

Information Obtained by Uterine Sounding

mentioned later, the introduction of the uterine sound is dangerous ly necessary. When it is necessary to use it, the information obtained over the following points:

Size and Shape of Cervical Canal.—Is there stenosis? If so, is it located at the external os or the internal os or between the two? Is there anteflexion of cervix? This is indicated by a sharp bend forward of the canal at the internal os. In such a case, even when there is no obstruction, the sound often stops at this point because it impinges on the posterior wall of the canal, and if force were used the wall would be injured. Curve the sound sharply so as to throw the point forward in a direction to pass the bend.

Position of Body of Uterus.—Does the point of the sound pass in the direction normally occupied by the uterine canal or is the canal, and consequently the body of the uterus, displaced? If so, is the displacement backward or forward or lateral? The direction of the canal helps also in determining which of two masses in the pelvis is the uterus, in cases in which this cannot be otherwise determined.

Length of Uterine Cavity.—Is there enlargement of the uterus? If so, to what extent? In chronic inflammation and in subinvolution there is slight enlargement. In tumors, particularly in large intramural fibroids, there may be great elongation and distortion of the uterine cavity.

Pain.—There is usually some pain as the sound passes the internal os. In certain cases of inflammation and of neuralgic trouble, the pain is much increased and the excessive tenderness may extend to the entire endometrium.

Bleeding.—A drop or two of blood may follow sounding when the uterus is normal, but many drops or a slight stream following careful sounding, indicates a pathologic condition of the endometrium.

Contraindications to Uterine Sound

There is considerable danger in the use of the sound, even when handled with care. It may carry infection into the uterus or it may, by the irritation, stir to activity a chronic inflammation or it may injure the wall of the canal or it may perforate the uterus and enter the peritoneal cavity. The danger of perforation is especially marked in a uterus recently pregnant or the seat of malignant disease. When proficiency in the bimanual examination is acquired, the introduction of the uterine sound will seldom be necessary.

Remember the following rules as to sounding the uterus:

Do not sound unless there is some special reason for it.

Do not sound when there is active inflammation in the vagina or cervix with the body of the uterus free or when there is an acute or subacute salpingitis.

Do not sound when there is a suspicion of pregnancy.

If not extremely careful, you are liable in some doubtful case to inadvertently sound a pregnant uterus and cause serious trouble for the patient and for yourself. To avoid this, it is a good plan always, just before introducing the sound, to ask the patient, "When did you menstruate last?" and to ask yourself, "Is there any suspicion of pregnancy in this case?" If there is suspicion of pregnancy, put the patient on some treatment that cannot interfere with pregnancy and watch the case until the next menstrual period. If you doubt the patient's statement that she is menstruating regularly, tell her that you must see her when menstruating the next time, that you may determine the nature of the flow. In that way you can determine whether or not she really menstruates.

EXPLORATION OF UTERUS WITH CURET

The exploration of the interior of the uterus with the curet, without anesthesia, is for the purpose of removing pieces of tissue for microscopic examination. Usually curettage under anesthesia is preferable. In some cases, however, there are contraindications to anesthesia or for some other reason it is thought best to try to secure some tissue for microscopic examination so that a diagnosis may, if possible, be made before giving an anesthetic.

The curet used for such exploration should be small and should have a sharp cutting edge (Fig. 147, d).

Method of Procedure

The preparations are the same as for sounding the uterus—in fact, exploration with the sound should immediately precede exploration with the curet. The slight dilatation required and the subsequent exploration with the curet, are usually best carried out with the patient in Sims' posture.

In some cases the cervix will readily admit this small curet without dilatation. Usually, however, some dilatation is necessary and this is most easily effected with the graduated dilators (Fig. 147, b) of metal or hard rubber. Beginning with the small size, the dilators are introduced one after another until the required dilatation is secured. The cervix is caught and steadied with a tenaculum forceps, while dilatation is being made. As a substitute for uterine dilators, the ordinary steel bougies for the male urethra do very well in most cases. If preferred, the dilatation may be effected with a small bladed dilator (Fig. 147, c) or a curved uterine dressing forceps. The bladed instrument is introduced closed and then gradually opened sufficiently to give the required dilatation. This is more painful usually and less convenient than the graduated dilators. All the manipulations should be made gently, and nothing more than slight dilatation should be attempted, as it would cause too much pain. This dilatation without anesthesia is not practicable in the virgin, ordinarily, though in some cases it can be carried out very well.

Formerly tents were much used for dilating the cervix. Such a tent was simply a dry cone of some substance which, when moist, gradually expanded with sufficient force to dilate the cervix. The dilatation required several hours and sometimes several days, the patient in the meantime being given morphine on account of the pain. The substances used were sponge, laminaria and tupelo. Many deaths were caused by infection resulting from the use of tents, and even in skilled hands and with all the modern antiseptic precautions, tents still cause serious trouble at times. Consequently their use has been almost abandoned. If used at all, the tent should be covered with a sterilized rubber tent-cover.

After the required dilatation has been secured, the curet is introduced and portions of the diseased endometrium removed for microscopic examination. If there is persistent bleeding after the use of the curet, an intrauterine application of a 10 per cent copper sulphate solution may be used. If the bleeding still persists, a small piece of antiseptic gauze should be packed firmly into the uterine cavity and the vagina also packed with gauze. The gauze may be removed in two days and an antiseptic vaginal douche given once or twice daily for a few days.

Contraindications.—The use of the curet for diagnosis is contraindicated by the same conditions that contraindicate the sound. The use of the curet without anesthesia, as just described, is not nearly so satisfactory as the regular curettage under anesthesia.

RECTOABDOMINAL PALPATION

In many cases it is of decided advantage to follow the vaginoabdominal and speculum examinations by a rectoabdominal examination. The index-finger, gloved and lubricated, is introduced into the rectum and the anal and rectal tissues palpated. Search is made for evidences of hemorrhoids (with or without thrombosis or inflammation), stricture, malignant disease, ulceration, proctitis, fistula, and fissure. The examining finger is then passed upward between the utero-sacral ligaments, as far as possible up the posterior surface of the uterus. With the fingers of the other hand pressing down the organs from above, all the structures within reach are palpated with the palmar surface of the rectal finger (Fig. 148).

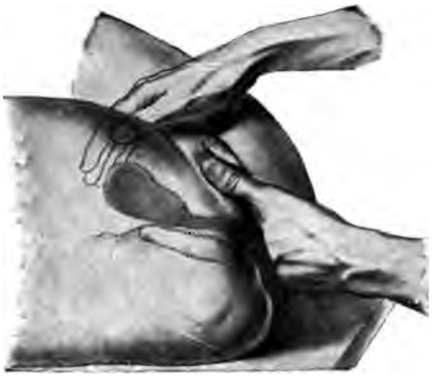


Fig. 148.—Rectoabdominal palpation. The hand should be gloved. (Montgomery—*Practical Gynecology*.)

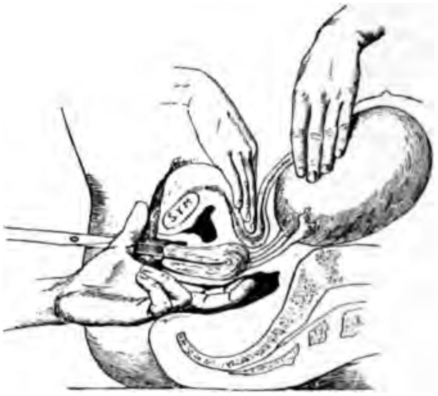


Fig. 149.—Palpating the pedicle of a tumor, with the tumor pushed up into the abdominal cavity and the uterus caught with a tenaculum forceps and pulled downward. (Montgomery—*Practical Gynecology*.)

Disadvantages

Ordinarily, palpation of the pelvic structures may be carried out much more thoroughly by vaginoabdominal examination than by rectoabdominal examination. Without anesthesia but one finger can be used in the rectum and this finger lies at a considerable distance from the uterus and adnexa, unless carried very high. It cannot usually be carried very high on account of the encircling sphincter and pelvic floor, except by the use of such force as to cause pain and resistance. In some cases where the pelvic floor is lax, the examining hand may easily carry the perianal structures some distance into the pelvis, thus allowing the examining finger to pass high up back of the uterus and permitting accurate bimanual palpation of the adnexa. The facility with which the organs may be felt is increased by catching the cervix with a tenaculum forceps and bringing the uterus somewhat lower. In all but exceptional cases, however, accurate examination of the pelvic contents by rectoabdominal palpation is practicable only under anesthesia. However, such palpation as can be carried out without anesthesia gives information of value in some cases, as indicated in the following paragraphs.

When Useful

It is well to employ digital examination per rectum and conjoined (bimanual) rectoabdominal palpation, in the following cases:

Mass in Culdesac.—Rectal palpation is useful when there is a mass of inflammatory exudate or a tumor low in the peritoneal culdesac back of the uterus. In the case of an inflammatory mass in that situation, fluctuation may be in some cases detected while it is not yet appreciable by vaginal examination.

Pediculated Tumor.—In some cases the pedicle of a tumor can be appreciated best by rectoabdominal palpation. (Fig. 149.)

Malignant Infiltration.—In malignant disease of the cervix extending out into the parametrium, rectal palpation will in some cases give additional information as to the extent of the infiltration and the mobility or fixation of the uterus.

Rectal Disease.—When a patient gives symptoms pointing to rectal disease, the rectum should of course be examined by palpation and also by inspection through rectal speculum if necessary to determine the exact condition.

Obscure Cases.—In cases where the other methods do not show lesions sufficient to account for the symptoms, a rectal examination should be made to determine whether there is any rectal or perirectal disease that might account for the pelvic pain and distress.

Examination in a Virgin.—When palpation of the interior of the pelvis is necessary in a girl or unmarried woman, sufficient information may in some cases be obtained by rectoabdominal examination, thus avoiding vaginal examination. In rectal palpation, the cervix can be felt through the rectal wall. If there is no mass back of the cervix (inflammatory mass or tumor or corpus uteri deep in the culdesac) and no area of particular tenderness in the pelvis, it may be advisable to postpone further local examination and try general therapeutic measures for some weeks or months. On the other hand if the information obtained by the rectoabdominal palpation is too indefinite to warrant a conclusion, then the vaginoabdominal examination is to be carried out. Usually the hymen will admit one finger without much disturbance, provided care is exercised in the slight stretching often required. If the opening is unusually small or resistant, then no satisfactory examination can be made except under anesthesia.

In a large proportion of virgins, rectoabdominal palpation or even vaginoabdominal palpation does not permit accurate outlining of the uterus or of an adnexal mass. Consequently, when there is serious pelvic trouble necessitating an accurate palpation of the pelvic contents, anesthesia is often required. In the cases where the necessity of this thorough pelvic examination is apparent from the first, it is just as well to arrange at once for the examination under anesthesia, which eliminates the embarrassed perturbation of the patient, and also pain and muscular tension, and permits complete exploration. If the patient has dysmenorrhea with obstructive symptoms or excessive menstrual flow requiring uterine dilation and curettage, that may be carried out at the same time.

Rectovaginoabdominal Palpation.—In exceptional cases when making the rectoabdominal examination, it is advantageous to introduce the thumb into the vagina in order to grasp the lower part of a mass between the finger in the rectum and the thumb in the vaginal canal. the structure being pushed down within reach by the abdominal hand (rectovaginoabdominal palpation Fig. 150). Where a mass is low enough to be grasped in this way, its outline and consistency can be very accurately determined. It is only in cases of large vaginal opening and relaxed floor that this method is applicable, and to be of much service anesthesia is usually required. Occasionally, however, it is useful in the ordinary examination without anesthesia.

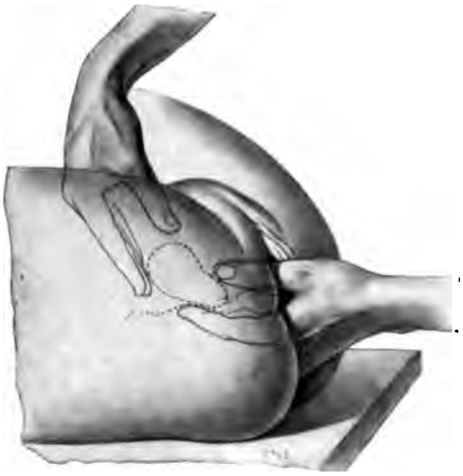


Fig. 150.—Rectovaginoabdominal palpation. One or two fingers of the gloved hand are introduced into the rectum and the thumb into the vagina, and the uterus, or other mass low in the pelvis, is grasped between them, as it is pushed down by the abdominal hand. (Montgomery—*Practical Gynecology.*)

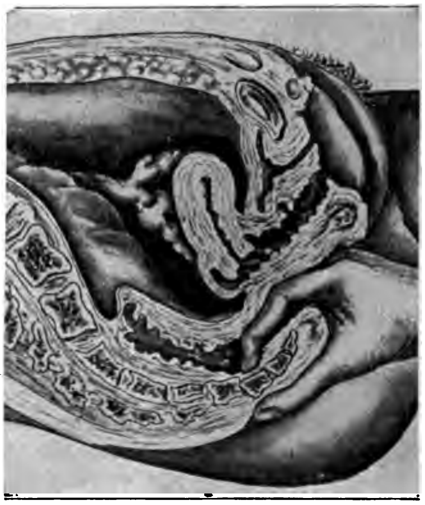


Fig. 151. Method of palpating the coccyx. The hand should be gloved. (Hirst—*Diseases of Women.*)

A modification of this method is to introduce the middle finger into the rectum and the index finger into the vagina and palpate the structures between the fingers, as the uterus is pushed down from above.

Palpation of Coccyx.—In cases of persistent pelvic pain where no sufficient cause is found about the uterus or adnexa, the coccyx should be palpated. This small bone at the tip of the sacrum is not infrequently the site of neuralgia or rheumatism (affecting the joints or adjacent muscles) or a chronic inflammation resulting from an injury sustained months or years ago. These injuries can usually be traced to childbirth though occasionally such a condition will result from a fall. In some cases, neuralgia or rheumatism or inflammation may become manifest here without previous injury. Tenderness of the coccyx or a mass about any portion of it or a deformity, may be easily determined by an examination with the gloved index finger in the rectum and the thumb over the coccyx (Fig. 151). The examination is most conveniently made with the patient lying on her side. In this way the coccyx may be accurately outlined and any deviation from the normal determined. In some cases the coccyx appears to be normal until an attempt is made to move it, when there is severe pain, indicating trouble in the joint or about the fasciae or muscles.

X-RAY EXAMINATIONS

X-ray examination has proved very valuable in the diagnosis of certain conditions in the genital tract, and also in the differential diagnosis of certain conditions of adjacent organs. As to conditions in the genital tract, it is employed especially for the following purposes:

1. To determine patency of the fallopian tubes, by demonstrating abdominal pneumoperitoneum after intrauterine insufflation of gas (oxygen or carbon dioxide).
2. To show fetal bone-shadows in obscure cases of pregnancy.
3. To determine the presence of adhesions and other pathologic conditions by x-ray examination through the pelvis after the production of pelvic pneumoperitoneum.

1. To Determine Patency of the Tubes

This marks a great advance in the handling of sterility cases. By introducing carbon dioxide or oxygen into the uterus under measured pressure, the patency or occlusion of the fallopian tubes may be established. If one tube is patent the gas passes freely into the peritoneal cavity, and is shown by the x-ray examination immediately made. If no gas passes into the peritoneal cavity the occlusion of both tubes is shown, and it is then clear that no treatment of the lower genital tract could overcome the sterility. As to whether or not the patient should be subjected to operation to overcome the occlusion of the tubes, that must be determined by careful consideration of several factors and is taken up later under the subject of Sterility (Chapter XIV).

The steps in x-ray determination of the patency of the tubes are as follows:

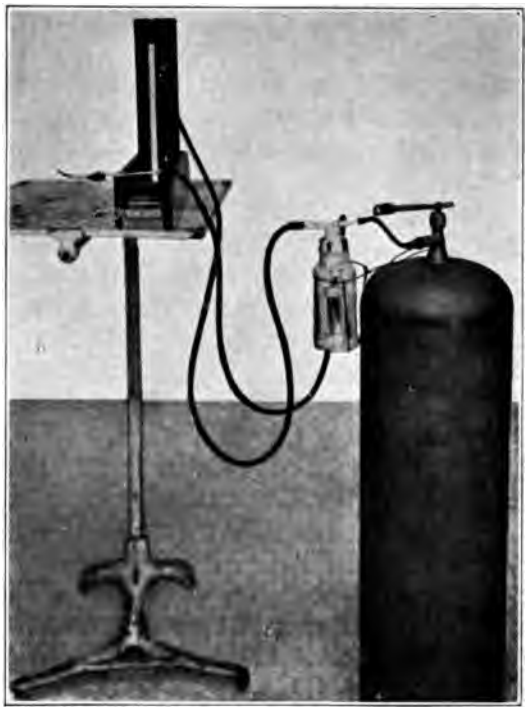


Fig. 152.—Older apparatus for insufflating gas through fallopian tubes. (Rubin—*Am. Jour. Roentgenology.*)

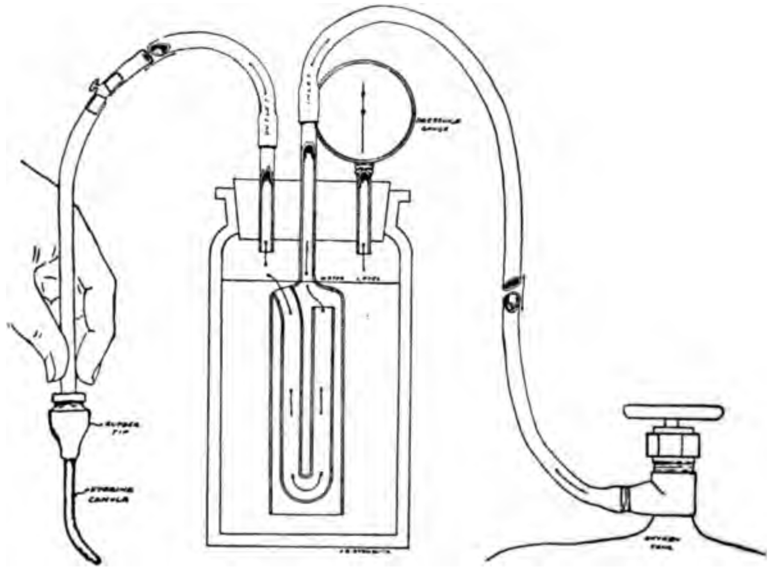


Fig. 153.—Newer apparatus for insufflating gas through tubes. (Rubin—*Am. Jour. Roentgenology.*)

(a) Selection of cases. Not every case of sterility needs to be subjected to this special examination. It is well first to treat cervical erosions and discharges that may interfere with impregnation, to make office dilatation of the cervical canal when needed, to improve ovarian function by a general tonic regime and administration of corpus luteum when indicated, and, of course, to determine that the husband delivers vigorous spermatozoa.

Acute and subacute inflammation in the genital tract must, of course, be excluded. Also, the gas must be introduced aseptically and with proper care and technic, including volume and pressure measurement.

The introduction of the cannula into the uterus, as later described, may ordinarily be accomplished with but little discomfort. If the canal is found to be so small or distorted that the sound cannot be easily introduced, there is a possibilty that the cervical condition itself is a factor in the sterility. In that case it is advisable to postpone the determination of the patency of the tubes until the cervical stenosis has been overcome by thorough dilatation under anesthesia, and there has been a subsequent try-out for pregnancy for a time.

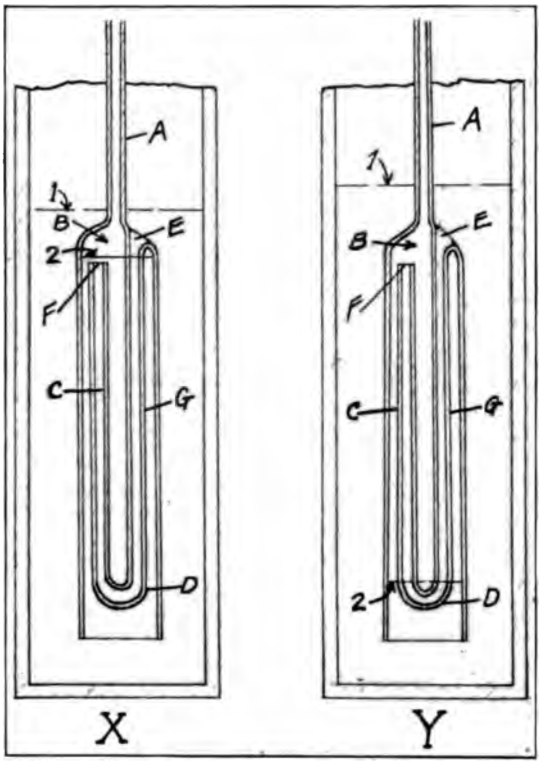


Fig. 154.—Pulsating gas meter. (Peterson—*Am. Jour. Obst. and Gynec.*)

(b) Introduction of gas. The apparatus for the introduction of the gas consists of (1) a metal cannula of the Keyes-Ultzman type, with several small perforations near its tip and fitted with a conical rubber stopper for closing the external os (Figs. 152, 153, 155), (2) an arrangement for measuring the gas as it passes through water, (3) a manometer for measuring the gas-pressure, and (4) the tank containing the gas to be used, i.e., carbon dioxide or oxygen, preferably the former. It is well to have a needle-valve, for releasing the gas pressure, at a convenient part of the tube near the uterine cannula. The older form of apparatus is shown in Fig. 152. Here the volume of gas is estimated by the rate of bubbling through water, and the pressure is shown by a mercury manometer. The newer and more convenient arrangement is shown in Fig. 153, where the flowing gas is measured by a Wallace and Tiernan syphon-meter and the pressure is measured by a Tycos type of manometer.

The intrauterine cannula may be introduced with the patient in the Sims posture or in the dorsal posture. When special difficulty is likely to be encountered the Sims posture is preferable. All the instruments needed are sterilized, i.e., intrauterine cannula, vaginal speculum, uterine dressing forceps, uterine sound, and a pair of rubber gloves. The speculum is introduced, the cervix exposed and caught with the tenaculum forceps and steadied. The external os and vicinity is then sterilized with iodine or picric solution. The size and direction of the cervical canal is tested with the uterine sound and if no obstruction is found it is ready for the introduction of the cannula connected with the gas apparatus. The further points in the use of the apparatus, as well as the explanation of its parts, are best given by quoting from Dr. I. C. Rubin, who has done such excellent work in developing this method of examination.

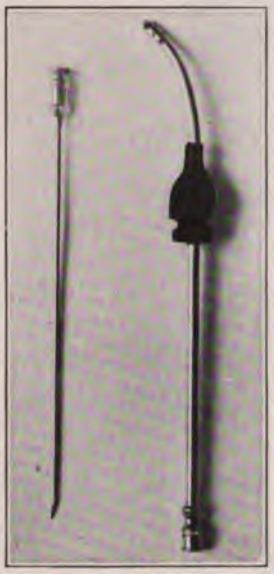


Fig. 155.—Needle and uterine cannula for pneumoperitoneum. (Peterson—*Am. Jour. Obst. and Gynec.*)

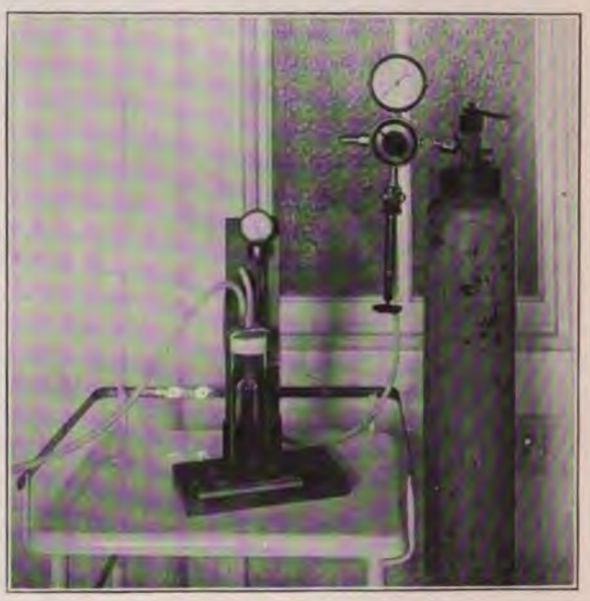


Fig. 156.—Apparatus for pelvic pneumoperitoneum, with gas pressure valve. (Peterson—*Am. Jour. Obst. and Gynec.*)

"The present apparatus enables us to measure the quantity and flow of oxygen or carbon dioxide gas used in insufflating the uterus to test the fallopian tubes for patency. A manometer of the 'tycos' or mercury type is combined with it, allowing for pressure reading at the same time as the gas flows. It does away with the necessity of first displacing water from another vessel at a certain rate of flow to estimate the volume of gas. This at best was only an approximate estimation.

"In this apparatus the pulsating type of water-displacement meter is used. It is adapted from the well-known chlorine control apparatus employed by the firm of Wallace & Tiernan for water purification by the process of chlorination. The meter is of glass and is therefore noncorrodible and consists of an inverted glass siphon within a cylindrical glass meter. The latter is calibrated to a given capacity, as a rule 40 c.c. It is hydraulic in principle, scientific, accurate, and dependable. The upper end of the glass cylinder is attenuated to a narrow tube to which rubber tubing is attached to convey the gas from its source. The lower end dips down into the water contained in the large glass tube or jar of convenient size (Fig. 153). This glass tube or jar is provided with a rubber stopper perforated at three points, through one of which the narrow end of the volumeter passes. Two separate glass tubes pass each into the container to just below the lower limit of the stopper (Fig. 153). To one of these the pressure gauge is attached and to the other a piece of rubber tubing for the outlet of the gas. To this piece of rubber tubing the intrauterine cannula is attached. A spring relief valve may be provided which works automatically, or in lieu of this a needle valve is placed in the course of the outlet tubing. I have found this latter to be effective and easy to handle. The spring valve is regulated to blow off at a pressure of 250 millimeters of mercury. While this can be dispensed with, it is an aid and is well combined with the needle valve relief. Fig. 153 represents the apparatus as assembled from the parts as described. For the convenience of those who do not care to take the trouble of doing this I have

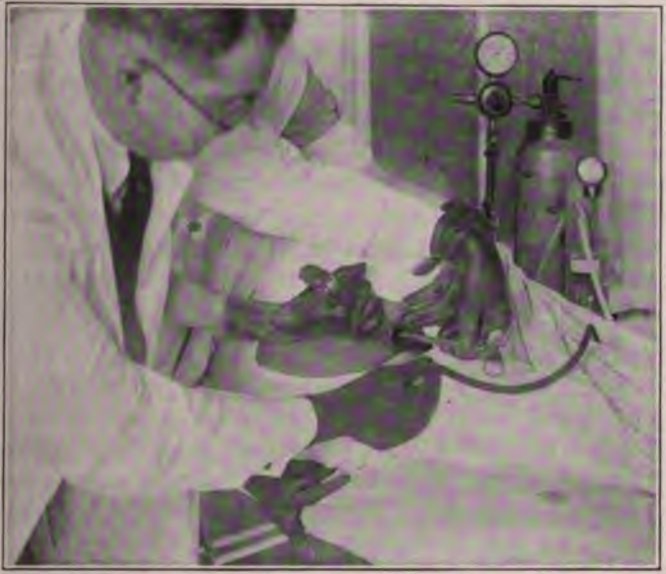


Fig. 157.—Position of patient and apparatus in uterine gas insufflation. (Peterson—*Am. Jour. Obst. and Gynec.*)

had the siphon meter and glass jar with outlet and inlet connections blown in one piece and attached to mercurial manometer.

"The operation of the siphon meter is as follows: View X (Fig. 154) shows the water level 2 in the meter at the beginning of the pulsation, and view Y shows the water level 2 just before the siphon C-G breaks at D, which completes one pulsation of the meter. When the downward flowing gas in A reaches the point D, it will rush up through the tube G of the syphon, and the bell or compartment B will refill with water up to the upper end of C. This completes one pulsation or measure of the meter, and the amount of gas delivered by this one pulsation is, of course, the capacity of the compartment B between the points F and D. The siphon meter used in my work has a capacity of 40 c.c. The amount of gas flowing may be determined by counting the number of pulsations of the meter per minute.

"For the purpose of determining the patency of the fallopian tubes, four pulsations delivering 160 c.c. of gas are all that are required. In thin individuals from two to three pulsations will suffice to produce in the patent cases the subphrenic pneumoperitoneum which will be clearly seen with the fluoroscope. The pressure reading is of considerable importance, and I have found that the rate of flow is best regulated previous to a rise of 100 millimeters within 15 seconds. This can be determined readily by pinching the outlet tubing as the flow is regulated until it causes a rise of pressure to 100 mm. mercury in 15 seconds time. A ratio of 10 seconds to 100 mm. will also be satisfactory; but in the nonpatent fallopian tubes, where the matter of pressure is of somewhat greater importance than in the case of patency, it is better to have the slower rate of flow, i.e., the 15 seconds to 100 mm. mercury. With this rate established (and this is done in a few seconds) the gas is allowed to pass through the volumeter and thence to pass through the outlet tubing and cannula into the uterus. The needle valve is released until the cannula is inserted well into the uterine cavity beyond the internal os when it should be shut, making the system air-tight. Almost instantly the pressure rises at the rate predetermined and will vary somewhat in cases of patency. The pressure required to overcome the resistance of the uterus and tubes where there is no tubal obstruction to the free passage of the gas will vary between 40 and 100 mm. When reaching these points it will fall sharply or slowly or even fluctuate about them. Occasionally the initial rise of pressure in the patent tubes will be higher, reaching 160 before it drops. The significance of this will be taken up in another communication.

"In the nonpatent tubes the pressure rises steadily to a point well beyond 200. It is not necessary to carry this beyond 250 mm., because in all the cases so far examined this pressure was found to indicate occlusion. When, as occasionally happens, the gas will go through after reaching a pressure of 200 mm. mercury, that case may for practical purposes be considered sterile, because the obstruction is nearly complete. But it must be borne constantly in mind that the rate of flow must not exceed in rapidity that of 100 mm. in 15 seconds. I have used a slower rate of flow in many cases, particularly in the nonpatent cases where it is desirable to check up the finding of the first examination. This can be done during the same sitting when the flow is retarded, so that it requires 20 to 30 seconds to raise the mercury column to 100 millimeters. Thus far the apparatus has been used in 225 cases and has given complete satisfaction."*

The quantity of gas above mentioned is for oxygen, which on account of the very slow absorption and resulting persistent discomfort must be used in minimum amount. When carbon dioxide, which is rapidly absorbed, is employed larger quantities may be used. This point is taken up further under pneumoperitoneum for diagnosis of adhesions and other pelvic lesions.

(c) X-ray Examination.—X-ray examination is carried out in the regular way for fluoroscopic and plate-detection of gas in the peritoneal cavity, the position of the patient being changed as needed.

2. To Show Fetal Bone Shadows

After the fetal bones have formed, the bone shadows as shown by x-ray examination may be used as an aid in differential diagnosis in obscure cases. The question as to how early in gestation an x-ray diagnosis of pregnancy may be made from the bone shadows has been recently reviewed in an instructive article (Bartholomew, Sale and Colloway, Jour. Am. Med. Assn., lxxvi, 912). Positive bone-shadow x-ray evidences of pregnancy do not appear until four and a half to five months after conception. Keeping this limitation in mind, ordinary x-ray examination may be helpful in differential diagnosis in the following conditions:

(a) A large mass which may be a pregnant uterus or a uterine tumor (soft myoma) or an adnexal mass from which the uterus cannot be differentiated. The questions here would be, first, whether or not a pregnancy is present, and if so then, second, whether or not it is in the uterus. If only irregular bone shadows appear, it must be kept in mind that they may be due to a pregnancy too early to show the characteristic systematically-arranged shadows, or to an ovarian dermoid, or to calcified areas in a uterine myoma. If there is still serious difficulty in the diagnosis, further x-ray help may be obtained through the use of pneumoperitoneum as explained a little further along.

(b) In a clearly extrauterine mass which may be an extrauterine pregnancy or a tumor or an inflammatory mass. With such a mass operation is usually required whichever of the three conditions is present, and hence the extra expense of x-ray examination may not be necessary. Moreover, tubal pregnancy ruptures early and the mass is usually blood clots with no fetal bones to show by x-ray. However, there are certain conditions with such a mass, in which x-ray examination may be of real help. For example, in a case presenting the possibility of advanced extrauterine gestation, x-ray examination would show the bone shadows of advanced pregnancy if such were present.

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*I. C. Rubin, Am. Jour. Roentgenology, Vol. 8, p. 459. Other phases of the subject are taken up by Rubin in other articles, for example: Jour. Am. Med. Assn., lxxiv, 1017; Jour. Am. Med. Assn., lxxv, p. 661, and Am. Jour. Roentgenology, viii, 120.

3. Pelvic Pneumoperitoneum for Diagnosis

The production of pneumoperitoneum by injecting gas (oxygen or carbon dioxide) into the peritoneal cavity has been found to aid greatly in the differentiation of abdominal structures in x-ray examination. This has been used extensively for the differentiation of conditions in the upper and middle portions of the abdomen, and is now being extended to the lower abdomen and pelvis. For satisfactory use in the pelvis it is necessary to employ an apparatus for holding the patient in an inclined prone position approximating the knee-chest posture. Peterson has done a large amount of excellent work in developing this refinement in pelvic diagnosis, and the matter can be best presented by quoting extensively from one of his recent articles (Am. Jour. Obst. and Gynec., ii, 349).

"It is the purpose of this communication to give the results of some ten months' use of roentgenography after the injection of the pelvic and abdominal cavities with gas. Beginning the work with doubt and misgivings as to freedom from danger and practicality from the diagnostic standpoint, it can be emphatically stated that at the present time doubts have been cleared away and that it is one of the most useful procedures ever introduced into the clinic. Like all roentgenographic procedures, it requires long and close study before the plates of the pelvic and abdominal organs can be correctly interpreted. It was an easier matter after some experimenting to secure good plates from a technical standpoint, than it was to interpret what the plates showed.

"Hence it follows that the obstetrician and gynecologist in order to obtain the quickest and most accurate returns from his work with pneumoperitoneum, must associate himself with an expert roentgenologist. Moreover, the latter must be interested in this new field and be ready to devote the necessary time to the interpretation of plates the like of which he may never have seen before. In fact it must be teamwork from the outset. To the gynecologist with his surgical experience can be safely entrusted the extremely simple technic of gas inflation, either through the uterus or the abdominal wall. He can be instructed even in the methods of making the plates. It is asking too much, however, to expect the clinician at the outset to interpret what is depicted on the plates. His work and experience have not been along these lines, for he has had to employ the x-ray but seldom in his work.

"Personally I am very fortunate in having associated with me in this pneumoperitoneal x-ray work my colleague, Doctor James G. Van Zwaluwenburg, without whose cooperation nothing could have been accomplished. Not only has he willingly spent many hours studying out the meaning of the various pelvic shadows, bringing into play his accurate and comprehensive knowledge of roentgenography, but his patience has been unfailing in guiding me along hitherto unknown paths.

"When we began this work Doctor Van Zwaluwenburg and I agreed that elaborate, complicated, clinical technic must be avoided, if a method was to be developed available for the average diagnostician and clinic. Hence the gas inflation, practically from the beginning, has been made in the gynecologic examining room of the University Hospital.

"Aside from the emptying of the lower bowel and bladder, the patient needs no special preparation for the gas inflation. In a few of our early cases when oxygen gas was employed, the patient was fortified by a hypodermic of morphine, but this is neither necessary nor expedient when the quickly absorbed carbon dioxide gas is used. Moreover, the use of morphine is inadvisable in the case of ambulatory patients who form quite a proportion of this material at the clinic, since out- as well as in-patients are inflated for diagnosis.

"No expensive or elaborate table is necessary for gas inflation, merely one where a moderate tilting of the body downward can be secured. We have found this inclined position to be absolutely essential for the best results, since it is necessary for the pelvis to be freed from bowel coils if the pelvic structures are to be shown. This can be easily brought about by the use of the modified Trendelenburg posture with the patient in the prone position. One such table will suffice, although in the clinic it has been found more convenient to make the injection, either through the uterus or abdomen, on the ordinary examining table, transferring the patient to the other table for the x-ray of the pelvis.

"At first we used the method of Stein and Stewart, employing a bag between the tank and the point of injection, forcing the gas through the needle by pressure on the bag. This method was abandoned in favor of Rubin's apparatus by means of which the gas can be passed under a pressure which is easily gauged, while the amount injected can be accurately measured.

"It is evident that before passing the gas into the abdomen or pelvis, it is necessary to regulate the amount of gas issuing from the tank under great pressure. We have had great difficulty in regulating the flow with the ordinary levers or wheels with which the tanks are provided. It really required more knowledge and experience to move the lever of the tank to secure the requisite gas flow than to use the cannula or needle. This difficulty has been done away with and the whole inflation made simple, easy and accurate by the use of a gas pressure reducing valve by means of which the flow of gas from the tank can be easily regulated (Fig. 156).

"The uterine cannula is of metal of the Keyes-Ultzmann type perforated at the tip and provided with a rubber obturator for closure of the external os after the passage of the cannula so as to prevent the escape of the gas backward into the vagina (Fig. 155). The ordinary spinal puncture needle is well adapted for the perforation of the abdominal wall and the inflation of the abdominal cavity (Fig. 155).

"The instruments necessary for the gas inflation are scrupulously sterilized before use. The abdominal wall, or in case the transuterine route be employed, the cervix, especially in the region of the external os, is prepared by the free use of iodine. Rubber gloves, sterile towels, etc., are employed just as in any surgical procedure. Unless these precautions be taken, it is easily conceivable that infection may follow gas inflation and not be due to any irritation set up by the gas itself. In order to settle the question whether oxygen or carbon dioxide gas as furnished in the ordinary tanks, contained bacteria, as has been claimed, numerous bacteriologic tests were made of these gases as they emerged from needle or cannula. In every instance the cultures showed no growths. It has been asserted that the low temperature of the gas as it issues under pressure from the tank gives rise to peritoneal irritation. This does not hold true for gas passing through the rubber tubes, because the temperature of this gas as it issues from the needle or cannula was always found to be that of the examining room.

"Obviously one must use common sense in the selection of patients to be subjected to gas inflation. Up to the present time no patient with acute inflammatory pelvic disease has been inflated by either route. When the history of recent inflammatory disease is doubtful, even should the patient have a normal temperature, no chances are taken, but the inflation is conducted by the transperitoneal route. While neither shock nor depression have followed the gas inflation, it has been refrained from in certain individuals with impairment of the circulation. In other words the watchword of the clinic in this work has been to take no chances but to always be on the side of safety.

"In none of the 300 cases of gas inflation has there been any sign of peritoneal irritation. Thus we think we are justified in the conclusion that with the proper selection of cases and with the proper technic there is no danger attached to gas inflation.

"The transuterine is the method of choice since it throws much light upon the patency or nonpatency of the fallopian tubes. The gas can be introduced with as little discomfort to the patient by this as by the transperitoneal route. Where the tubes are found impermeable, the gas is introduced through the abdominal puncture. If the gas be passing freely through the tubes into the pelvic cavity, it is our custom to allow enough to flow so that a satisfactory x-ray of the pelvis can be obtained. In other words, the procedure of Rubin for determining the permeability of the tubes with small quantities of gas, has been carried a step further in case the tubes be patent. This has been done deliberately because of the impossibility with present methods of determining whether the gas be passing through one or both tubal openings. In case one tube be diseased and the other open, the condition of the pathologic tube will be shown by the pelvic x-ray.

"The Sims has been found preferable to the lithotomy position where the gas is passed by the transuterine route (Fig. 157). The cervix is exposed after the introduction of the speculum and the anterior lip of the cervix seized by the tenaculum forceps after the cervix and adjacent portions of the vagina have been sterilized by iodine. Care is taken to remove all secretions from the cervical canal, a short distance from the external os. The general direction of the uterine canal is located by the sound and the uterine cannula passed, the rubber obturator being pressed within the canal until a snug fit is secured. Dependent upon the condition of the cervix, more or less outward pressure must be exerted upon the tenaculum, else the gas will escape backward into the vagina. It must not be forgotten to test the permeability of the cannula before its introduction. In case of. blockage, the manometer index will quickly rise, showing that the instrument is faulty. Failure to observe this simple precaution for both cannula and needle may lead to wrong deductions.

"The apparatus should have been previously set by means of the gas pressure valve for about six or eight pulsations a minute. Since the average gasometer of this type measures about 25 cubic centimeters of gas to each pulsation, the apparatus set at this rate of flow will allow of the passage of 125 to 200 cubic centimeters per minute. This amount should be used as a standard, as it has been determined by experience that this is about the maximum quantity which should be passed through normal tubes in one minute.

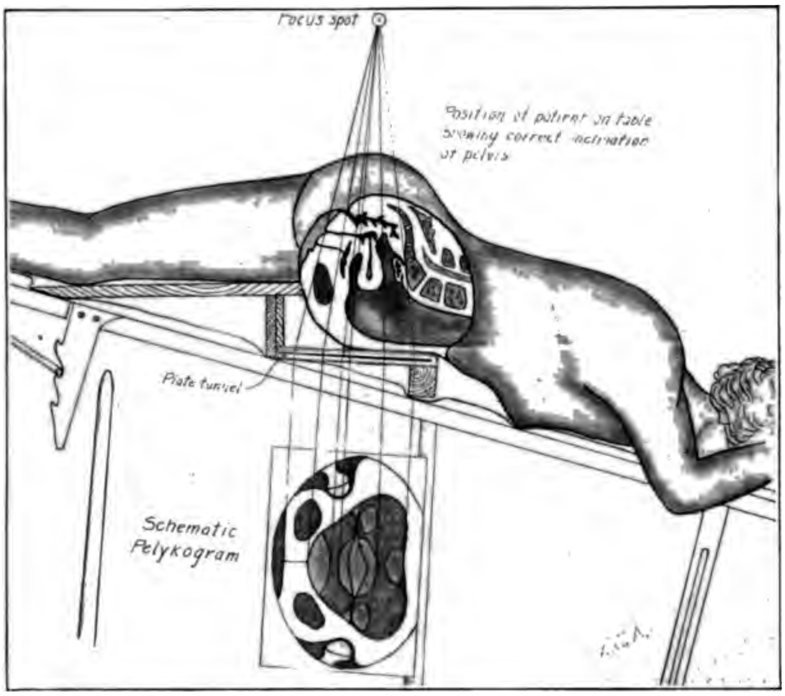

Focus spot
Position of patient on table showing correct inclination of pelvis
Plate tunnel
Schematic Pelykogram

Fig. 158.—Diagrammatic representation of position of patient for pelvic pneumoperitoneum. (Peterson—*Am. Jour. Obst. and Gynec.*)

"If the tube or tubes be permeable after the gas has been allowed to flow through the cannula there will be a rather rapid rise of the manometer to about 100 or 110. Then as the gas continues to flow there will be quite a sharp drop from 30 to 50 points, at which place the manometer index remains quite steady. On the other hand, if there be any resistance to the flow of gas through the tubes, there will be a steady rise of the manometer and the flow of gas should be stopped at the 200 point. At first we believed that if the gas did not pass at 150 after two or three trials it could be concluded that the tubes were closed. However, further experience, especially with patients under anesthesia, has shown that patent tubes may require the 200 pressure repeated four or five times before the gas will pass. Whether this means that some obstruction exists in these cases at the isthmic portion of the tube has not been determined.

"At first we used too large quantities of gas, some two or three liters, with corresponding pain and discomfort to the patient. Experience has shown that this quantity of gas is unnecessary, if the patient's pelvis be raised and the table tilted so that the gas can rise in the pelvis (Fig. 158). This is accomplished after the proper amount of gas has been introduced by holding the patient on the tilting table, face downward in the knee-chest

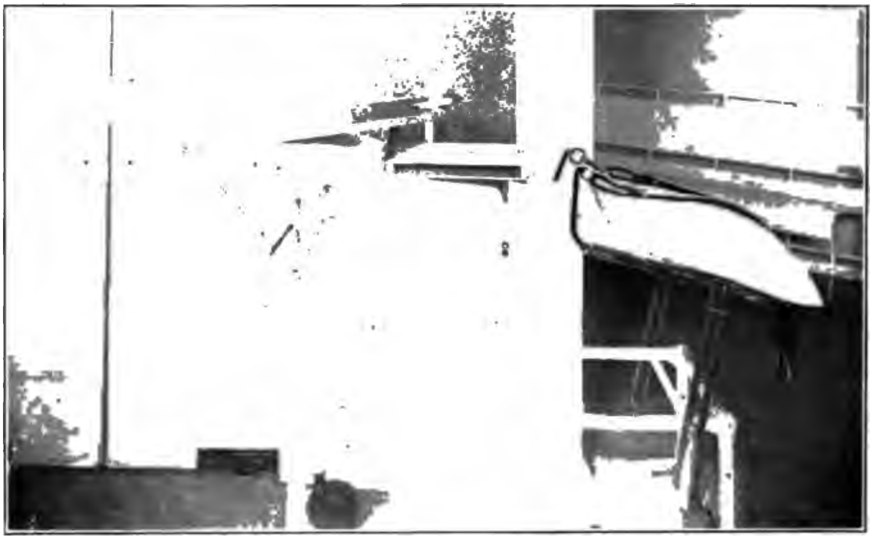


Fig. 159. Table arrangement for holding patient in position. (Peterson—*Am. Jour. Obst. and Gynec.*)

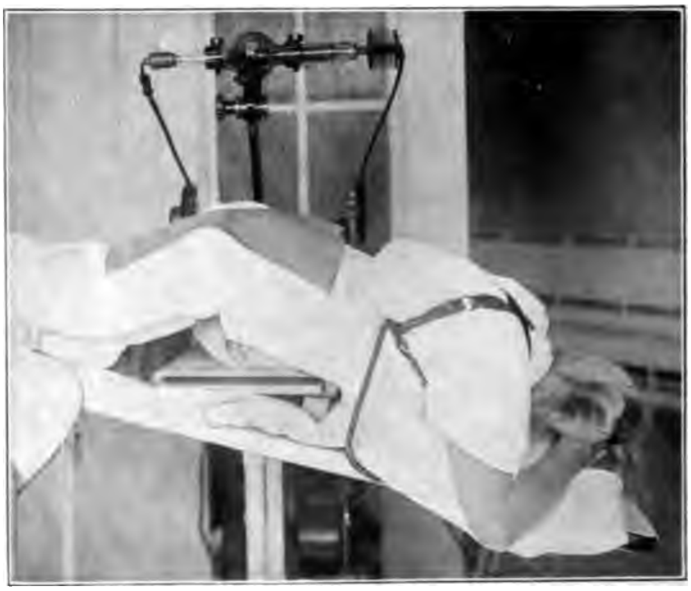


Fig. 160. Patient in position on table. (Peterson—*Am. Jour. Obst. and Gynec.*)

position, until an inclined board can be placed beneath the thighs. This board makes an angle of about 28 degrees with the plane of the table. Its upper portion is cut out and rounded so that the pubes come to lie just above the deepest portion of the notch. A plate changing tunnel is then placed horizontally on the table and the table tilted forward, the patient prevented from slipping by means of shoulder straps (Figs. 159, 160).

"Experience has shown that to get the best results the table should be inclined at an angle of about 20 degrees. Excessive inclination of the table, when the pelvic organs are floated forward by the gas, causes too great displacement and makes the pelvic x-ray confusing.

"A Coolidge portable unit operating on the ordinary lamp circuit furnishes the x-ray, the direction of the ray being in the long axis of the pelvis and perpendicular to the plate (Fig. 158). An 18-inch square of opaque fabric with a 6½ inch circular hole cut out of its center is laid on the patient's buttocks and serves as a diaphragm. Double screened films are used and the exposure varies from 14 to 20 seconds. The tube shift is in the long axis of the body and the stereo set so produced is used as though the patient were lying on the right side.

"The best results so far as the x-ray plates are concerned, taking into consideration the comfort of the patient, are obtained by the use of from 800 to 1000 cubic centimeters of gas. Larger quantities of gas quickly injected cause great discomfort and even pain to the patient. Hence it has been our constant aim to reduce the amount of gas injected to a minimum, our efforts being greatly aided by the use of the table arrangement just described. Since the patients complain of a sense of fullness in the lower abdomen and some discomfort when only 300 to 400 cubic centimeters of gas have been introduced and since that quantity has been found too small for proper inflation, it is obvious that a certain amount of discomfort will always be present. However, the sensation, excluding highly nervous women, may be described as discomfort and not the pain which always accompanies overinflation.

"At first we used oxygen gas but abandoned it because it was too slowly absorbed, with corresponding persistence of the discomfort. Deflation relieved to some degree the symptoms but necessitated a second needle puncture, which for obvious reasons did not improve the technic. For these reasons we substituted for the oxygen, carbon dioxide gas which is absorbed so far as symptoms of discomfort are concerned in from twenty minutes to one-half hour. After inflation with this gas, patients return to the ward or leave the hospital without discomfort a half hour after the plates have been taken. In fact the one disadvantage of this gas is the necessity of having the technic of plate taking work perfectly smoothly. Delay beyond a certain point means so much carbon dioxide gas absorption as to materially lessen the chances of good roentgenograms.

"In addition to acute pelvic disease, profuse, purulent and bloody uterine discharges are considered contraindications to the passage of the gas by the transuterine route. In such cases the gas is passed through the abdominal wall by the following technic: The skin of the abdominal wall from the umbilicus nearly to the pubes and for a width of eight inches is sterilized with iodine. A fold of the abdominal wall just below the navel is compressed laterally with the left hand and raised upward and made tense. A spinal puncture needle is passed through this fold in a slightly upward direction at a spot in the median line one and one-half inches below the umbilicus. If the skin be made tense and the needle be sharp, no preliminary anesthesia of the skin will be necessary. The needle is passed downward until it meets the resistance of the fascia, the left hand still keeping tense the fold of the abdominal wall. The needle is then thrust through the fascia and peritoneum, a little experience giving accurate information to the hand when the peritoneum has been pierced. The stylet is then withdrawn from the needle and the latter connected with the rubber tube leading from the syphon meter. The latter is set by means of the pressure valve to about ten pulsations to the minute, so that it will require approximately four minutes at the rate of 25 cubic centimeters of gas at each pulsation for 1000 cubic centimeters of gas to pass into the peritoneal cavity.

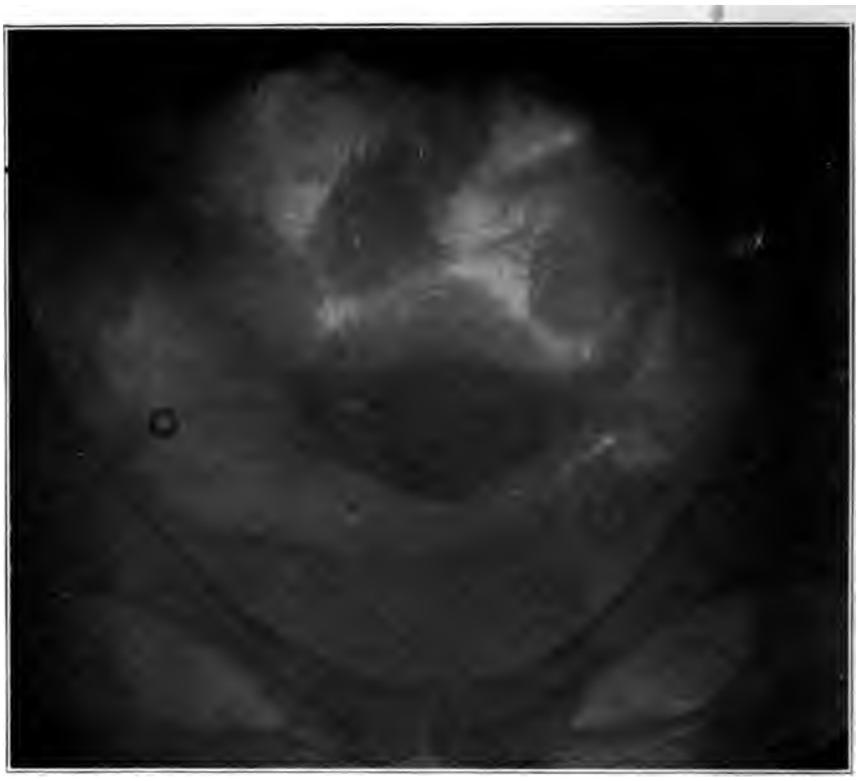


Fig. 161.—Pneumoperitoneum, x-ray plate, normal pelvis. (Peterson—*Am. Jour. Roentgenology.*)

"The objection that in case the needle does not pierce the peritoneum, the gas may be forced through the subcutaneous tissues is not valid, since by the manometer it can be told at once whether the gas is flowing freely into the cavity or is meeting with an obstruction. When the needle has penetrated the peritoneum the manometer index rises first some 15 or 20 points but falls usually immediately to almost zero. In case this fall does not occur the patient should be directed to take a deep breath which will have the effect of lifting the point of the needle from anything which may be obstructing it.

"At first the skin at the point of puncture was anesthetized by Schleich's solution but this has been discontinued since it was found that very nearly as much pain was produced by this procedure as by the passage of the needle. Obviously if the point of election for the puncture is over what may be an adherent intestine or if a neoplasm lies beneath this site, another portion of the abdominal wall must be chosen.

"Before the patient is inflated in addition to a careful history of her case she is subjected to a most complete bimanual pelvic examination to which is added a rectovaginal examination if the case seems to call for it. Without going into details it will suffice to say that an attempt is made in every case to record on the examination sheet what the pelvis contains, not in general but in specific terms. For example, if in the case of inflammatory disease to the left of the uterus the ovary and the tube can be made out, it is so stated. If neither can be recognized by the examining finger, it is so recorded. The same holds true regarding adhesions, relation of neoplasms to the uterus, etc. In other words such terms as sensitive mass, boggy mass, left-sided inflammatory mass have been discarded since our work has been

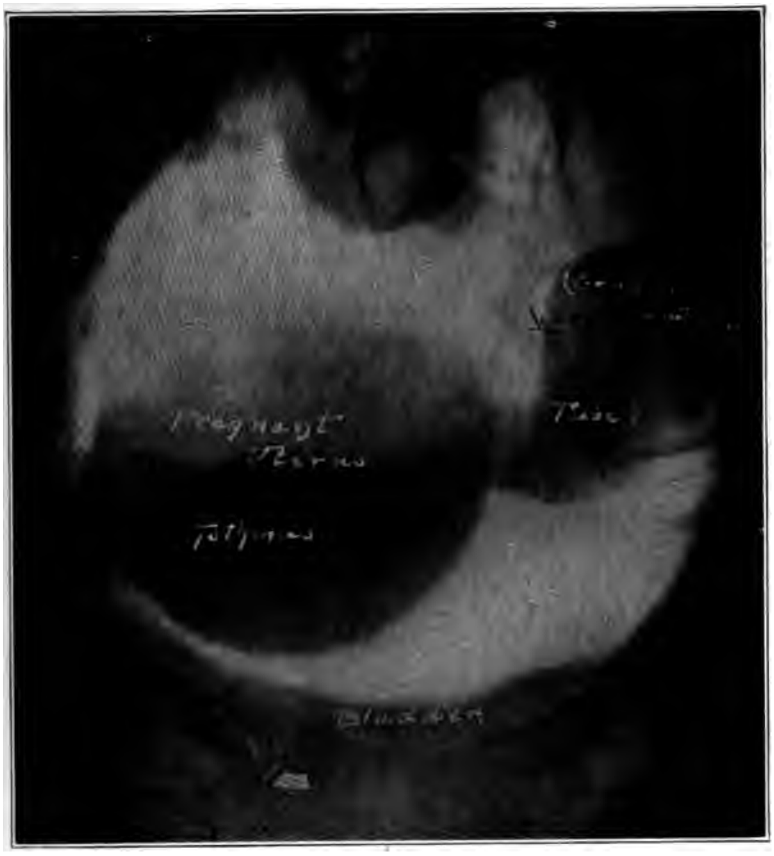


Fig. 162.—Early pregnancy. Uterus in right side of pelvis. (Peterson—*Am. Jour. Roentgenology.*)

checked up by the x-ray. We may and do make mistakes but at least they are definite errors from which valuable lessons can be learned.

"The plates are taken to the x-ray laboratory and interpreted by Doctor Van Zwaluwenburg without reference to the clinical findings. Then the clinician and roentgenologist go over the plates set up in stereo in an endeavor to reconcile the two findings. If the case be operative, the patient is carefully examined under anesthesia and the actual findings, uninfluenced by the x-ray study of the plates, are recorded. If the abdomen be opened, the position and condition of the pelvic organs are dictated at the time and the final records of the case together with any removed organs are studied with the plates.

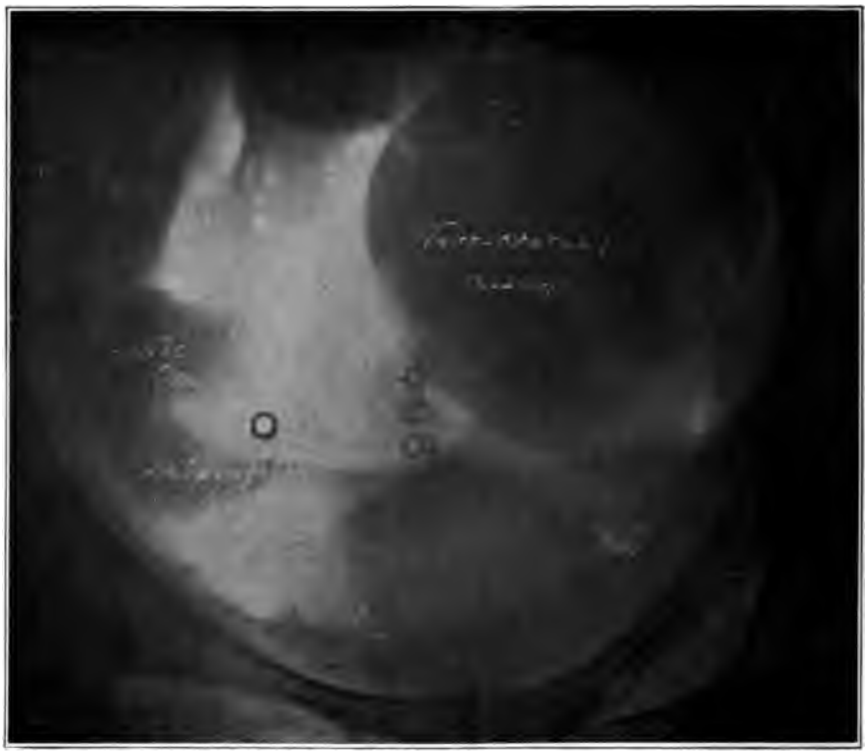


Fig. 163.—A tuboovarian mass in left side of pelvis. (Peterson—*Am. Jour. Roentgenology.*)

"It certainly has been surprising to see how often it has been impossible to determine accurately by the examining finger the exact condition of the pelvic organs. I had failed to realize how much I was depending upon the opening of the abdomen to clear up fine points in diagnosis. From a study of the history together with a thorough pelvic examination it was decided whether the case was an operative one or not. The patients were always examined under anesthesia prior to operation but not so much to determine more accurately the exact pelvic pathology as to confirm the opinion that the case was one for operation. For always the easier method of making the exact diagnosis was ahead of one since everything was to be cleared up after the incision had been made.

"All this has been changed since the x-ray of the pelvis has been utilized as an aid to diagnosis. The clinician is placed upon his mettle, so to speak. He carefully weighs his opinion regarding the size and position of the uterus, the tubes and ovaries, if he is to go over his recorded findings and compare them with those of his colleague whose only knowledge of the case is what he sees depicted on the roentgenograms. Renewed interest is aroused in being able to diagnosticate prior to operation what had been considered rather minor pelvic conditions, such as the exact position of the ovaries and tubes, or whether they be free or slightly adherent. At any rate it is a fact that preoperative diagnosis, since the advent of the pelvic x-ray, has received a tremendous impetus in the clinic and has greatly improved.

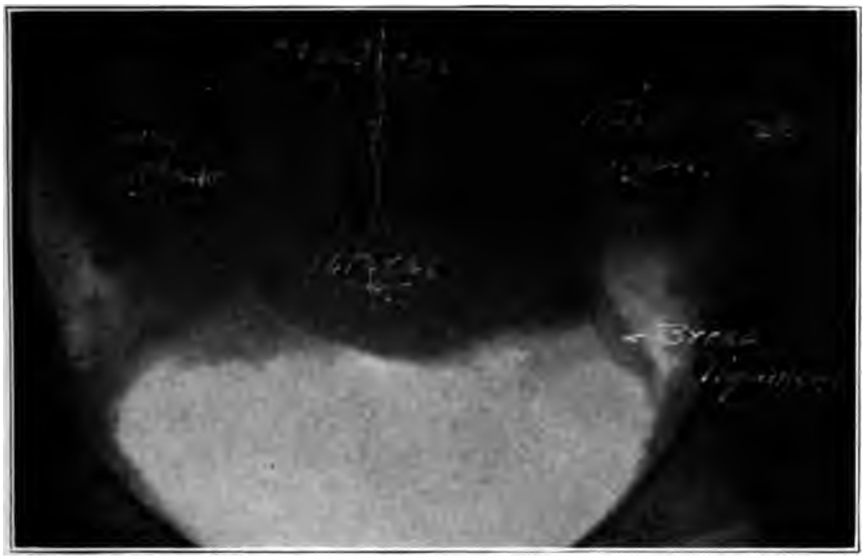


Fig. 164.—Adhesions in posterior part of pelvis. (Peterson—*Am. Jour. Roentgenology.*)

"In definitely stating what can be seen in technically good roentgenograms of the pelvis it must be borne in mind that this new field is constantly changing. What could not be seen at the beginning of our work is perfectly apparent today and the same will probably apply to interpretations of plates months from now. However, enough can be made out at the present time to be of great aid in diagnosis.

"The pelvic organs are represented on the plate by optical cross sections at the point of tangency of the projecting rays (Figs. 158, 161, 162, 163, 164). The uterus is nearly always clearly outlined and one can judge of its position, size and contour. If not drawn to one side by adhesions or displaced by a neoplasm, so that the ray as it is shot in the axis of the pelvis catches it fairly, the uterus will show two cross sections, one of the body and one of the isthmus or supracervical portion. It has been found that the isthmus is greatly enlarged and extends more into the broad ligaments in cases of pregnancy than in the nonpregnant. So striking is the change in the isthmus that by this sign alone it has been possible to diagnosticate pregnancy by the x-ray as early as the sixth week and before softening can be determined definitely by the examining finger. The sign is constant from two and one-half months onward, but we have not had sufficient material to date to be too dogmatic about the presence of this enlargement of the isthmus in every case of early pregnancy.

"Irregularities of the uterus produced by fibroids and especially calcification changes in these growths are readily recognized on the x-ray plate. Through the changes in the isthmus described above, it has been found possible to diagnosticate positively the occurrence of pregnancy in a fibroid uterus at a stage when it could not be considered probable from the history and clinical findings. In a number of cases where the patient has been exposed to pregnancy and where menstruation is irregular it has been possible to state definitely that the patient was not pregnant because of the size of the uterus and the absence of change in the isthmus.

"Since experience has determined just the right inclination of the patient in the prone position on the table to bring about the proper forward and downward displacement of the appendages, normal ovaries and tubes can be shown on the x-ray plates with great regularity. The size of the ovary can be quite accurately estimated and usually it is perfectly possible to differentiate between the free and the adherent organ.

"It is not so easy to see normal tubes unless the gas has been passed by the transuterine route when from their distention they are quite clearly made out. Enlarged nodular noncystic tubes are well depicted upon the plates and not infrequently are much better seen than palpated. Especially is this true when the tubes are adherent to the sides of the pelvis and covered with plastic exudate. In these cases the clinician has long realized the difficulties of palpation and has depended upon the history, thickening in the region of the broad ligaments and decreased uterine movability as diagnostic signs of the condition.

"Pus tubes with adhesions to the broad ligaments and bowel coils are particularly well seen on the x-ray plates. To be sure the clinician usually has little difficulty in palpating fairly distinct sacular distention of the tubes but when the pelvis is the seat of an extensive inflammatory process it is often quite impossible to differentiate the distended tubes. From experience the examiner judges what will be found when the abdomen or posterior culdesac is opened but his differentiation of the contents of the pelvis is not nearly as definite as can be brought out by the x-ray."

EXAMINATION OF OTHER ORGANS

The differential diagnosis of genital lesions often requires careful investigation of one or more of the adjacent or associated organs. The following examinations are most frequently required:

1. **Cystoscopic Examination.**—Bladder, ureteral and kidney diseases are frequently associated with genital diseas [illegible] part of the

symptoms. Also, they may by themselves cause persistent symptoms very similar to those from disease of the genital tract. These conditions are differentiated by urine analysis, cystoscopic examination and ureteral catheterization, supplemented when needed by x-ray examination.

2. **Proctoscopic Examination.**—Affections of the rectum and sigmoid constitute an important source of pelvic distress. When there are symptoms pointing to possible disease of these structures, a careful investigation, including proctoscopic examination, should be made.

3. **Pelvic Bone and Joint Investigation.**—Palpation of the back of the pelvis and of the lumbar region, and accurate localization of backache and tenderness in these areas, constitute a part of the regular gynecologic examination already given. If this examination reveals evidence of any disturbance in the bones or joints, then x-ray examination of the pelvic and lumbar spine is indicated. There may be disease of one or both sacro-iliac joints or of the sacro-coccygeal joint or of the lumbar spine. In all of these conditions the x-ray is helpful in determining the existence and the extent of local trouble. In any case of persistent backache or pelvic pain without apparent cause, the possibility of a bone or joint lesion should be kept in mind. In a recent case seen by the author, in which there had been long continued pain in the right lower abdomen and pelvis without adequate cause having been discovered in repeated examinations, an x-ray examination of the pelvis and spine revealed an osteoarthritis of parts of certain lumbar vertebrae so situated as to affect the nerves going to the region of pain.

4. **Intestinal Investigation.**—X-ray investigation of the gastrointestinal tract is frequently required to determine whether a pelvic mass is in whole or in part an appendiceal or cecal mass, or a tumor of the sigmoid or small intestine or an agglutinated mass of intestinal coils.

5. **Neurologic Investigation.**—That portion of the nervous system distributed to the pelvis furnishes its share of local painful disturbances (neuralgia, neuritis, transferred pain) and local paralyses, which must be taken into consideration in the diagnosis and treatment of pelvic diseases.

There are, in addition, certain general diseases of the nervous system which cause complaint of pelvic symptoms and occasion much confusion in diagnosis. They are principally four; namely, hysteria, neurasthenia, hypochondria, and melancholia.

The recognition of these diseases depends, of course, on a knowledge of the clinical manifestations of each disease and a careful consideration of the symptoms presented by the patient. This differential diagnosis cannot be taken up here. All that can be done is simply to call attention to certain classes of patients with pelvic symptoms in which this special investigation of the nervous system should be carried out. They are as follows:

(a) Very nervous patients. The term "nervous" is used in the ordinary commonly-accepted meaning of the word. The patient is perturbed more
han one would expect under the circumstances. She may be simply fright-
embarrassed, or, on the other hand, she may have some decided

organic disease of the brain or nervous system, or some functional nervous disturbance.

The patient may have a well-marked pelvic lesion, but that does not cause the evidences of an unstable nervous system. What does?

This particular consideration of the nervous system need not necessarily be made at the first visit. The patient may be observed for a time, and possibly it will be seen that the nervous manifestations largely disappear as acquaintance is established. As long as the nervous symptoms persist, however, they constitute an undetermined factor in the case, with a possible bearing on the patient's loss of health.

(b) Pelvic distress without corresponding lesion. The complaint of a gynecologic affection for which no evidence can be found, may be due to pronounced hypochondria. Of course, there may be a real lesion, not appreciable to palpation, such as an adhesion without much infiltration but distorting or pulling an organ and thus causing symptoms. X-ray examination with pneumoperitoneum may help materially in such an obscure case by showing the presence or absence of adhesions.

The persistent manifestation by the patient of a fixed idea that she has some pelvic disease, which in fact is not present, may be due to beginning melancholia. On the other hand such complaints may be due to a deliberate attempt on the part of the patient to deceive the physician—hoping thereby to secure an opinion that would be useful in a suit for damages or for divorce, or hoping that the physician may use some examination method or treatment that would lead to an abortion.

6. **Endocritic Investigation.**—The system of ductless glands bears a very intimate relation to the development and functioning of the reproductive organs. It is this glandular system that is principally at fault in a considerable proportion of cases of amenorrhea, menorrhagia, dysmenorrhea, and other derangements of function. This subject is such an important one that a special chapter is given to it, and there (Chapter XV) the diagnostic points are given along with the physiologic and therapeutic data.

7. **Miscellaneous Tests.**—In suspected syphilis, suspected pelvic tuberculosis, and suspected chronic gonorrheal inflammation, the clinical evidences may be supplemented by certain special tests which in some cases are decidedly helpful.

Wassermann Reaction.—This blood test for syphilis has proved exceedingly helpful in many doubtful cases, and has served to clear up the diagnosis in many cases presenting an obscure and baffling symptom-complex. However, there has been a tendency in some quarters to place too much reliance on the Wassermann reaction and its modifications. The diagnosis should not be based upon this test alone, confirmatory clinical evidence being sought.

Tuberculin Test.—In cases of suspected pelvic tuberculosis, the tuberculin test may give material aid in reaching a positive decision. There are several methods of making the test. The tuberculin may be injected under the skin, constituting the subcutaneous tuberculin test of Koch. It may be worked into an abrasion of the skin, as in the cutaneous tuberculin test of

Von Pirquet. It may be combined with an ointment and rubbed into the unbroken skin, as in the percutaneous tuberculin test of Moro. Also, any of the mucous surfaces may be used for the percutaneous reaction. A solution of tuberculin may be dropped into the eye, constituting the conjunctival test of Wolff-Eisner and Calmette. The subcutaneous test and the cutaneous test are the two most used. The percutaneous test is too uncertain and the conjunctival reaction is too dangerous to the eye.

The test is essentially one for the antibodies rather than for the tuberculosis itself. To be antibodies there must, of course, be a tuberculous focus which produces the toxin that stimulates the cells to the production of antibodies in sufficient quantity to give a characteristic reaction. The absence of antibodies may depend on the condition of the lesion itself (quiescent, thoroughly walled off) or upon some general condition of the patient which prohibits the usual antibody formation from the toxin irritation. In patients markedly cachectic, from advanced tuberculosis or other disease, the vital reaction is often so slow that antibody formation is interfered with. The same result has been noted in many acute infectious diseases, including scarlet fever and measles.

In a patient in a fair physical condition and with no other acute disease, a negative reaction shows certainly the absence of tuberculosis (except a completely quiescent focus) while a good positive reaction shows certainly the presence of tuberculosis. It must be kept in mind, however, that the test does not show the location of the tuberculous lesion. Hence it does not necessarily follow that the pelvic lesion is tuberculous simply because the patient gives a good tuberculin reaction. The tuberculous lesion may be in a lung or a kidney or in the intestinal tract or it may be a bone lesion, etc. Whether or not the focus giving the tuberculin reaction is in the suspicious pelvic lesion, must be determined by other evidence. Some very serious mistakes have been caused by overlooking this fact.

Gonorrhea Fixation Tests.—The **blood serum fixation test** for gonorrhea, from which much was hoped, has proved unreliable. Cherry and Palma (Jour. Am. Med. Assn., 1921, lxxvi, 1572) reach the conclusion that neither the cutaneous test nor the complement-fixation test is of reliable diagnostic importance in differentiating pelvic inflammation of gonorrheal origin.

The **cervical secretion fixation test** seems more reliable. Smith and Stone brought forward this test (Jour. Am. Med. Assn., 1917, lxix, 1418). It is based upon the Bordet-Gengon complement-fixation reaction, but uses cervical discharge instead of blood from the patient to be tested. It is claimed that by thus using the discharge from the infected area the fixation test becomes more certain, and also becomes positive as soon as infection takes place and disappears as soon as a cure is effected. In a series of 45 cases of leucorrhea remarkably uniform results were secured—positive in the cases that were gonorrheal from other indications and negative in the cases that were apparently not gonorrheal. Blood serum fixation tests in the same series of cases gave practically no help in differential diagnosis. The stained slides showed gonococci in only a few of the cases, while the cervical secretion fixation test (Smith test) was positive in nearly all of the probably gonorrheal cases.

Pregnancy Serum Test.—The Abderhalden serum test for pregnancy requires such constant supervision and checks in materials and technic that it is not practical for regular diagnostic work.

PELVIC EXAMINATION UNDER ANESTHESIA

The advantage of anesthesia is that it eliminates PAIN and MUSCULAR TENSION, the two factors that make the ordinary pelvic examination incomplete and unsatisfactory in certain cases.

Preparations

In preparation for this examination the patient's bowels should be moved with a purgative on the previous day and the rectum should be cleared out with an enema an hour or two before the examination. The same preparatory examination of the heart, lungs and urine should be made as though anesthesia were for an operation. Have ready a light strong tenaculum-forceps, so that the cervix may be caught and the uterus pulled down as desired. If the interior of the uterus is to be explored, the antiseptic preparation for curettage must be carried out and the instruments prepared.

Examination Methods

The various manipulations employed in examination under anesthesia are as follows:

1. Bimanual palpation of pelvic interior.
    Vaginoabdominal palpation,
    Rectoabdominal palpation,
    Rectovaginoabdominal palpation,
    Rectovesical palpation.
2. Uterine investigation.
    Curettage,
    Exploration of interior of uterus with finger,
    Excision of piece of cervix for examination.

1. BIMANUAL PALPATION UNDER ANESTHESIA

Vaginoabdominal Palpation.—In vaginoabdominal palpation under anesthesia, the same manipulations are employed and the same facts concerning normal and abnormal pelvic structures are sought as in the ordinary vaginoabdominal (bimanual) examination. Under anesthesia, however, the examination is much more thorough. Deep palpation may be made in all portions of the pelvis, and the uterus, tubes, ovaries and abnormal masses may be clearly outlined in nearly every case. The position, size, shape, consistency, mobility and attachments of a pelvic mass may be determined with far more accuracy than without anesthesia.

In all doubtful cases, this method of examination should be employed before subjecting the patient to abdominal section.

In the examination under anesthesia, the manipulations must always be made carefully and gently, otherwise a collection of pus may be broken open internally, causing peritonitis, or the sac of a tubal pregnancy may be ruptured, causing fatal hemorrhage.

Rectoabdominal Palpation.—The rectoabdominal palpation under anesthesia is made for the same purpose as the vaginoabdominal palpation and in the same way except that two fingers of the gloved hand are introduced into the rectum instead of into the vagina.

Much additional information may in this way be obtained in some cases because, under anesthesia, the fingers can pass further up the posterior surface of the uterus. By catching the cervix with a tenaculum forceps and pulling the uterus downward, the posterior surface of the uterus and the ovaries and the broad ligaments may be palpated with but little intervening tissue.

To get the full benefit from this method, particular attention must be paid to details. After the patient is well under the anesthetic and as much information as possible has been secured by vaginoabdominal palpation, then make the rectoabdominal examination as follows:

1. Cleanse the rubber glove from all vaginal secretion or put on a fresh one (that no infection be carried into the rectum), and lubricate the glove well.

2. Introduce two fingers into the rectum. Under the anesthetic, the sphincter ani is readily dilated to admit the two fingers as they are carefully worked in. A much more thorough rectoabdominal palpation of the pelvic interior may be made with two fingers in the rectum than with only one.

The fingers are worked past the rectal folds, up between the sacrouterine ligaments, which serve as landmarks, and then as far up beyond as possible. The anus and pelvic floor are pushed into the pelvis as far as they will go, by firm pressure against the elbow of the examining arm, the elbow resting on the knee or against the hip, as in deep vaginoabdominal palpation. In this way the tips of the examining fingers may be carried far up into the posterior part of the pelvis.

There may be some difficulty in finding the rectal canal in the region of the sacrouterine ligaments. Sometimes the interior of the rectum feels like a large pouch without any opening extending higher. If you are satisfied to make the pelvic palpation by attempting to carry up the wall of this pouch, you will be much hampered. By locating the cervix uteri and then the two sacrouterine ligaments and working round to get past the rectal valves and folds, a small opening will be felt extending upward between the sacrouterine ligaments. Follow this up (it dilates easily) and you will find further progress unobstructed. The fingers are carried as high as they will go and then the abdominal wall is depressed from above by the other hand (Fig. 148).

3. The various structures in the posterior and central parts of the pelvis are then caught between the hands and outlined and otherwise examined by

palpation, one at a time. The palpation proper is made principally with the rectal fingers, the abdominal fingers serving simply to push down the structures to within reach of the fingers below. In this palpation, the guide is the body of the uterus. The fingers pass up the posterior surface of the uterus to the fundus and then out to the lateral region of each side, palpating the tube and ovary and any abdominal mass. In a patient with only a moderately thick abdominal wall, the ovaries and tubes may be distinctly outlined, unless they are obscured by adhesions or by an inflammatory mass or by a tumor.

4. Then catch the cervix with a tenaculum forceps and draw it down gently, and have some one hold the forceps to keep the uterus in the downward position. This drawing downward and forward of the cervix, throws the fundus backward so that it is caught between the rectal fingers and the abdominal fingers, and its size, shape, consistency, mobility and attachments may all be accurately made out.

The fingers then pass to the adnexa, determining the same points concerning them.

If there is a movable mass of doubtful origin, have some one catch it from the abdominal surface and pull it up towards the abdominal cavity so that the examining fingers (rectal and abdominal) may meet between the mass and the pelvic structures. In this way, the pedicle of the mass (if it arises from the pelvis) may be felt and traced to its origin, and also its length and thickness determined (Fig. 149). This is sometimes referred to as Hegar's method of examining the pedicle of a tumor.

5. Cautions. Particular care must be exercised that the structures be not injuriously pressed or pulled upon, for as the patient is anesthetized the usual warning complaint of pain is absent. There are three points that it may be well to mention particularly:

(a) Do not use much force in palpation. A pus sac may be broken, causing peritonitis, or a tubal pregnancy may be disturbed sufficiently to cause a fatal hemorrhage. In fact, a patient with suspected tubal pregnancy should not be examined under anesthesia until she is in the hospital or until things are ready in the home, so abdominal section could be carried out immediately should threatening symptoms arise during the examination.

Again, if much force is used the examining fingers may be pushed through the rectal wall into the peritoneal cavity. Kelly mentions cases in which this accident occurred and in which immediate abdominal section, or vaginal section, was carried out to repair the rent in the bowel wall and prevent fatal peritonitis.

(b) Do not draw down the uterus very far or very forcibly, for reasons already given. It is a good rule to bring the uterus down no further than is absolutely necessary to satisfactorily palpate it. In most of these cases all that is necessary is a slight downward displacement, that permits the fundus to go somewhat backward so that it can be grasped well between the rectal fingers behind and the abdominal fingers in front. The extreme downward displacement of the cervix, to the vaginal entrance or even outside, is not necessary or advisable, except in cases where there is already prolapse of the uterus. The occasion for it does not arise if the fingers are carried up the rectum by invagination of the pelvic floor, as above described.

(c) The suggestion to use the whole hand in the rectum for exploration in difficult cases was long ago made and carried out with disastrous results. This method should not be used. It has led to rupture of the rectum, with fatal peritonitis. Furthermore, no need for it is experienced if the palpation with two fingers is carried out with close attention to the details above given.

Rectovaginoabdominal Palpation.—In some cases, additional information may be obtained by this method. With the two fingers in the rectum, the thumb of the same hand is passed into the vagina and the lower part of the pelvic mass or of the uterus is grasped between the fingers and the thumb, the structures being pressed down within reach by the abdominal hand (Fig. 150).

In some cases, this is of decided assistance in outlining a small mass low in the pelvis and in determining the exact consistency of different parts of it. In certain cases, where there is a wide vaginal opening and relaxed pelvic floor, the examiner may palpate the uterus or other mass low in the pelvis, with almost as much accuracy as though it were removed and lying free in the hand.

A modification of this method is to introduce the middle finger into the rectum and the index finger into the vagina and palpate the structures between the fingers as the uterus is pushed down from above.

Rectovesical Palpation.—In the rectovesical palpation under anesthesia, a medium sized urethral bougie (about 21 F) is introduced into the bladder, and one or two fingers into the rectum. The tissues between the rectum and the end of the bougie are carefully palpated by the rectal fingers. This method is used in only two conditions—(a) in determining the presence or absence of the uterus in cases of atresia of vagina and (b) in distinguishing between inversion of the uterus and a large pedunculated fibroid hanging from the cervix. In a very stout patient, this method may be the only means of making a positive diagnosis in the classes of cases mentioned. If the bladder is not irritable, this method may be employed gently without anesthesia, but the examination under anesthesia is far more satisfactory.

Caution. Palpation with the finger introduced through the dilated urethra, the author mentions only to condemn. It is dangerous in that it is liable to cause permanent incontinuance of urine, a condition which resulted in several reported cases.

2. UTERINE EXPLORATION UNDER ANESTHESIA

Curettage.—Curettage for diagnostic purposes is carried out the same as regular curettage for therapeutic purposes. By it tissue is obtained from all portions of the endometrium for microscopic examination. As previously stated, this is much more satisfactory than the partial curettage without anesthesia, for by the curettage under anesthesia, tissue is removed from practically all parts of the cavity. Consequently, if in the subsequent microscopic examination no malignant tissue is found, we may be fairly certain that there is no

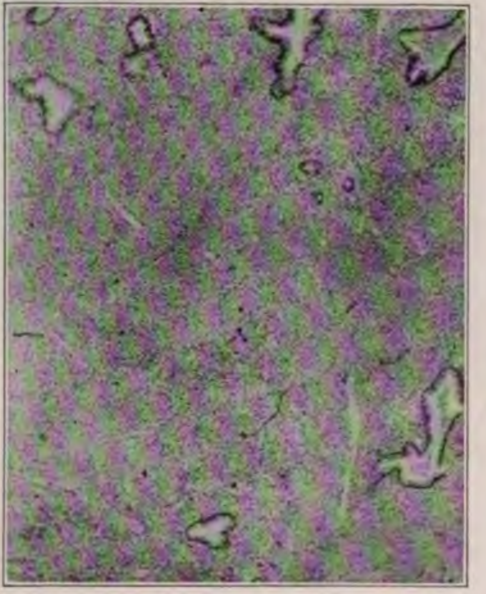


Fig. 165.—Curetting. Hyperplasia of endometrium with increase in stroma. Gyn. Lab.

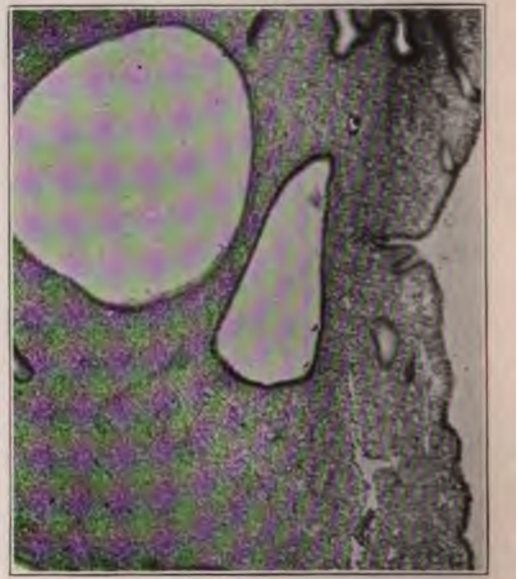


Fig. 166.—Curetting. Hyperplasia of endometrium, with cystic dilatation of glands. Gyn. Lab.

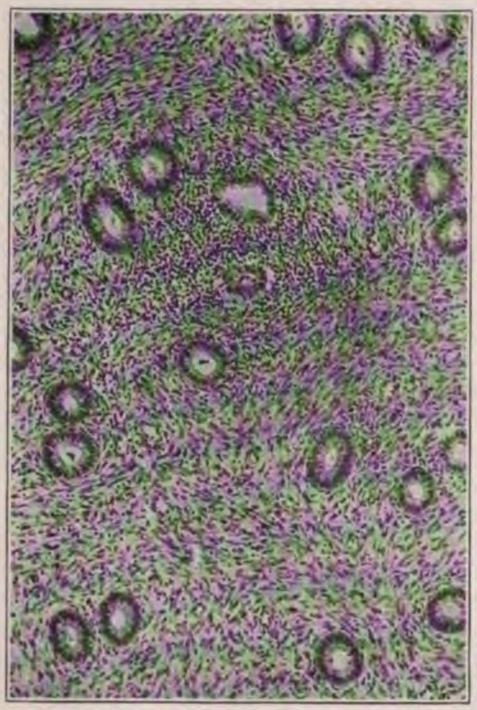


Fig. 167.—Curetting. Chronic endometritis. Gyn. Lab.

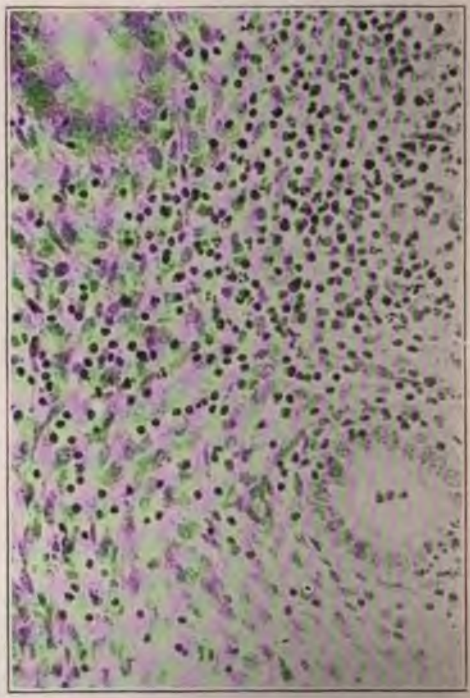


Fig. 168.—Curetting. Chronic endometritis, high power. Gyn. Lab.

malignant disease. Furthermore, regular curettage under anesthesia combines with its diagnostic value a decided therapeutic effect, for it removes the diseased endometrium and diminishes bleeding and discharge. As will appear later, curettage is often indicated in a particular case by both therapeutic and diagnostic considerations. For example, when a patient has uterine bleeding or discharge that resists ordinary treatment, curettage is indicated to stop the bleeding or discharge and also to furnish tissue for microscopic examination.

Of the various conditions that give rise to persistent bleeding and discharge, characteristic changes in the endometrium are produced by stromal hyperplasia, endometritis, carcinoma, sarcoma, and tuberculosis. The essential changes are explained in detail and illustrated under the various diseases.

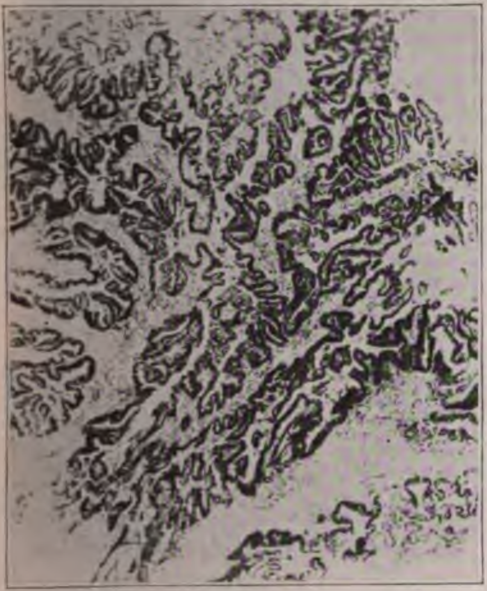


Fig. 169.—Curetting. Adenocarcinoma of the Endometrium. Low power. Gyn. Lab.

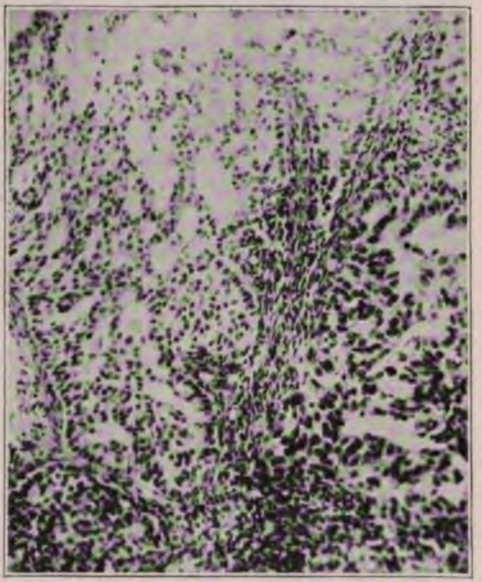


Fig. 170.—Curetting. Adenocarcinoma of the Endometrium. High power. Gyn. Lab.

A few illustrative photomicrographs from curettings are shown in Figs. 165 to 174.

In addition to the conditions which produce pathognomonic changes in the endometrium, there are other conditions, for example, extrauterine pregnancy, in which the microscopic appearance of the curettings in conjunction with other information may make the diagnosis positive in an otherwise doubtful case. When there is a growth of uncertain character in the uterine wall, the exclusion of malignancy by curettage shows it to be a myoma.

Collecting Curettings.—In a diagnostic curettage, observe the following points:

1. Remove the endometrium from all parts of the uterine cavity.

Put all the curettings directly into a small vessel and shake with water -clots. If the water is so bloody that it is desired to change

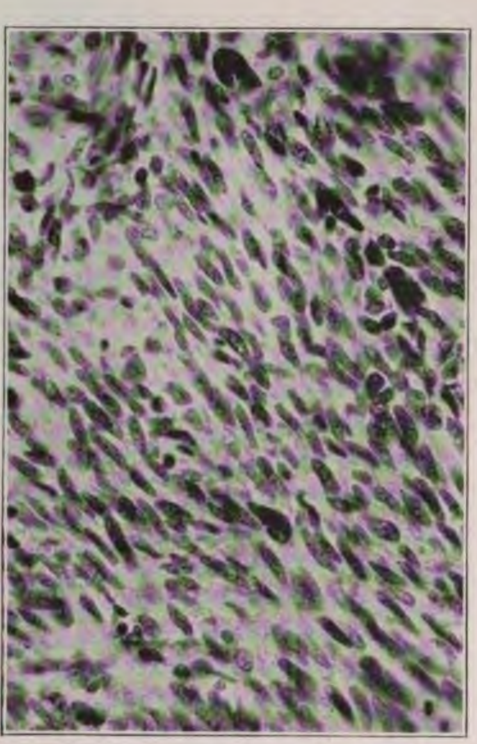


Fig. 171.—Curetting. Sarcoma of endometrium. Gyn. Lab.

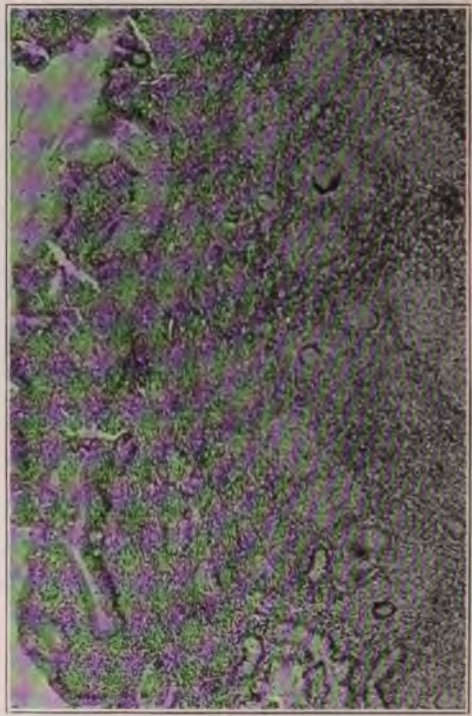


Fig. 172.—Curetting. Tuberculosis of endometrium. Gyn. Lab.

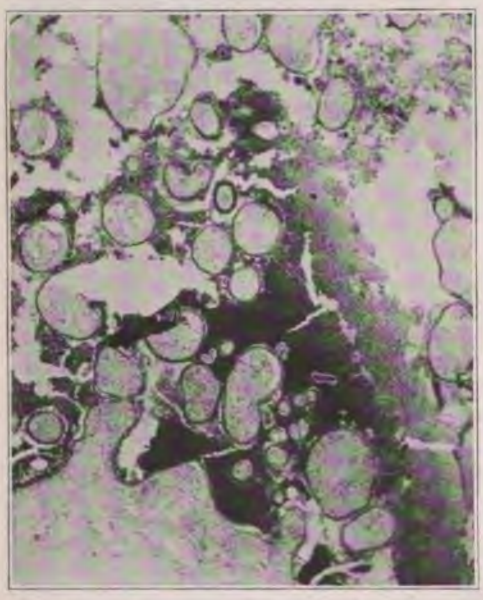


Fig. 173.—Curetting. Recent miscarriage, showing chorionic villi. Gyn. Lab.

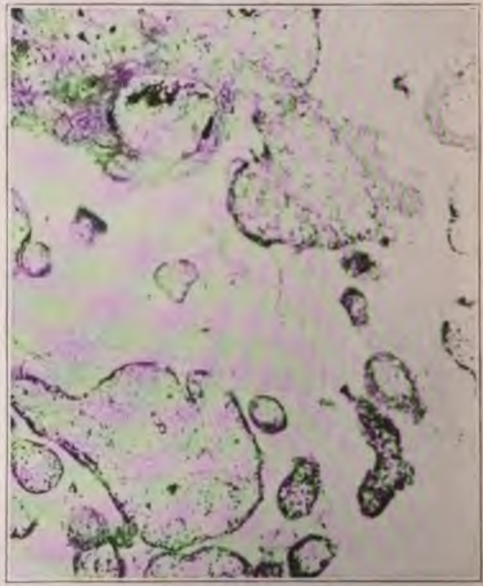


Fig. 174.—Curetting. Recent miscarriage, showing decidual cells. Gyn. Lab.

it for further washing, it is poured through gauze. The gauze catches the curettings, which are then emptied into fresh water. The water into which curettings are placed should be clear and clean. Normal saline solution is preferable to plain water as it causes less swelling to the cells, hence it should be used for the washing when the curettings are to be subjected to any particular or special examination.

3. Then transfer all the tissue fragments, without compression, to a small bottle containing 95 per cent alcohol or 10 per cent formol solution and send to the laboratory.

4. If the pathologist is in a distant city, the little bottle should be corked securely and put in a mailing tube or wrapped with cotton and otherwise packed securely for safe transmission.

5. With the specimen, send a note stating the nature of the specimen (curettings from within uterus), when obtained, name and age of patient and some of the important facts in the history of the case. Always give the date of the last menstruation, as the phase of the menstrual cycle at which the specimen is removed has an important bearing on the different diagnosis in many cases.

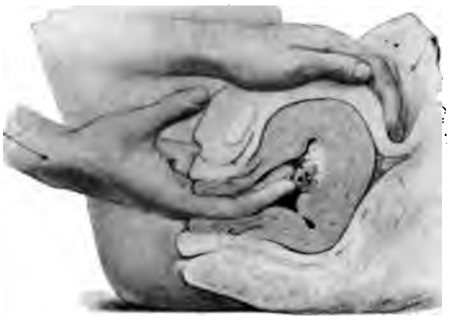


Fig. 175.—Exploration of the interior of the uterus with the finger. This represents a puerperal uterus with retained placental remnants. (Edgar—*Practice of Obstetrics.*)

Exploration of the Interior of the Uterus with the Finger.—This may be employed when satisfactory information cannot be obtained otherwise. The cervix may be dilated in the same manner as for curettage, i.e., with a strong-bladed dilator, but the dilatation must be carried much further, as it takes a larger opening to admit the finger than to admit the curet. The dilatation required for satisfactory exploration with the finger must be so wide that it is only in exceptional cases that it can be secured in the nonpuerperal uterus with the ordinary dilator.

To secure satisfactory dilatation, Schatz's metranoikter may be used. This consists of two blades separated by a strong spring. They are introduced into the cervix closed. The removal of the introducing handle releases the spring which gradually effects wide dilatation of the cervix, within twelve r-four hours. The pain is controlled by morphine. This instrument dilatation and may be used in preparation for examination under anesthesia where for some particular reason it is desired to palpate the interior of the uterus. Hirst has modified the Schatz metranoikter, making it with four blades instead of two.

A more certain and satisfactory method, when the patient is given an anesthetic, is to dilate the cervical canal to the usual extent with the regular bladed dilator and then divide the wall of the cervix with a knife or scissors, in the median line anteriorly up to or above the internal os. The bladder must of course first be separated from the cervix and pushed up out of the way. This allows a thorough exploration of the interior of the uterus with the finger. It is a rather formidable procedure for exploration alone and usually is employed only after preparations have been made to do a hysterectomy or other operation immediately after the exploration, if such is found necessary.

After sufficient dilatation has been obtained by one of the methods mentioned, the finger is introduced into the uterine cavity and the walls palpated, the uterus at the same time being pushed downward and steadied by the other hand the same as in bimanual examination. Some additional information may be obtained by this method, for example, we may determine the presence of irregularities of the uterine wall, of projecting growths, of softened or broken down places or of areas of induration.

Exploration of the uterine cavity with the finger is seldom necessary in the nonpuerperal uterus. In all but exceptional cases, the diagnosis may be made without it. In the puerperal uterus, it is exceedingly useful for determining the presence of placental remnants (Fig. 175) and for safely clearing them out. In the recently pregnant uterus no special dilatation measures are necessary because the cervix is so soft that abundant dilatation is secured with the ordinary bladed dilator or in some cases even with the finger alone.

Inspection of the Uterine Interior.—The metroscope is an electrically lighted endoscopic tube adapted in length and caliber to viewing the interior of the uterus. Its use may be advisable in rare conditions, but the fact must be recognized that the additional information it gives is very slight and is more than overbalanced by the danger that would result from its general use.

Excision of Tissue from Cervix.—Excision of a piece of tissue from the cervix for microscopic examination may be quickly carried out following curettage or other exploratory examination, when thought advisable. In this way a positive diagnosis of malignant disease of the cervix may be made in the early stage. This aid to diagnosis should be carried out during the examination under anesthesia whenever a suspicious ulcer or induration is present. A small wedge-shaped portion of the suspicious area, including some healthy tissue, is excised and the wound thus made is closed by one or two sutures of chromic catgut.

PREPARATIONS FOR GYNECOLOGIC EXAMINATION

The various points considered under this head may be grouped as follows:

Office Arrangements.
Directions to Patient.

Antiseptic Preparations.
Soap, Brushes, Lubricant.
Use of Rubber Gloves.
Avoid Unnecessary Exposure.
Preservation of Specimens.
Examination on Bed.

OFFICE ARRANGEMENT

There are three things of particular importance in the handling of gynecologic patients:

1. **Screened Area in the Consulting Room.**—The portion of the room that is used for the examination should be suitably screened from the other part, so that the patient may remove the corset and make such other arrangement of the clothing as she wishes, in privacy. It is very convenient to have a separate room for the examining-room, with an attached toilet-room. Where no separate room is available, a neat substantial screen, affording the patient privacy for the required preparation, does very well and is inexpensive.

2. **Table.**—A satisfactory table for gynecologic examinations is the regular surgical chair with footrests. The advantage of the footrests is that the patient's hips may be brought to the end of the table without her feet being forced so near the buttocks as to be uncomfortable. In the absence of a surgical chair, footrests may be attached to a plain table (Fig. 184).

3. **Nurse.**—When a physician is doing much gynecologic work it will be found a wise investment to have a nurse, to prepare the patients for examination and to prepare the necessary articles needed in office examination and treatment. Aside from the great convenience to the physician, it makes the patients more at ease and in addition tends to protect the physician from blackmail by designing persons. When a nurse is not required for other work, she may be hired just for the office hours.

DIRECTIONS TO PATIENT

Direct the patient to **remove the corset and loosen all bands** about the waist, so that the clothing may be pushed up and down sufficiently to bare the abdomen. This is necessary at first, for the first examination should be thorough, including examination of the entire abdomen as well as the pelvic exploration.. Examination of the breasts may be necessary in cases of suspected pregnancy. If there are indications of disease of the heart or lungs, those organs also should be examined, and the same is true of the nervous system.

In the subsequent visits, it may not be necessary to remove the corset or loosen the clothing, depending of course on what treatment or further examination is required. It is not necessary in ordinary cervical or vaginal treatments. Any treatment, however, necessitating deep bimanual palpation, such for example as replacement of a retrodisplaced uterus, requires the removal of the corset and loosening of bands.

After completing the abdominal examination, direct that the hips be brought to the foot of the table. The patient is covered with a clean sheet and under the sheet the skirts are pushed up above the knees and out of the way. The sheet is then parted so as to expose the genitals only, being draped so as to cover other parts. It is well, as a rule, to inspect the genitals, for often information of value is obtained in cases where the history gives no intimation of disturbance externally.

ANTISEPTIC PREPARATIONS

If you wish to protect your patient and likewise your hands from the danger of infection, certain antiseptic precautions must be taken. The necessary measures are simple and easily carried out, and if employed regularly become more or less a habit.

The needed disinfection will be indicated by naming the **dangers to be avoided,** which are as follows:

1. Infection of the patient from your hands. If your hands are well cleansed before each examination, there can be no infection from them.

2. Infection of your hands from the patient. If there is a scratch or abrasion anywhere about the fingers, the hand should be covered with a rubber glove. In fact, it is best to use a glove for every vaginal examination, for there may be cracks that are not noticed until infected. We hear a great deal about the danger of the patient's becoming infected, but very little about the danger to the physician; and yet there are few physicians of experience who do not number among their professional friends, one or more who have become infected with syphilis through abrasions of the hands. Dudley stated that he knew of not less than twenty physicians who have been infected with syphilis through abrasions of the fingers in digital examinations. Each physician must look out for himself and his family. Remember that "prevention is better than cure," and, it may be added, a great deal easier.

3. Infection of the patient from instruments. If the instruments are sterilized each time before use, there can be no danger from them.

4. Infection of the patient from the table. To prevent this, place under the patient's hips a rubber pad or piece of rubber cloth and over that a clean folded towel, or a sheet of towel paper, which is changed with each patient.

Precautions.—The precautions to be taken in order to avoid infection may be summed up in three rules, as follows:

1. **Disinfect and Protect the Hands.**—Trim the finger nails short and clean under them. Cleanse the hands well with soap and water and dry them with a clean towel. Protect the hand with a clean rubber glove.

2. **Sterilize the Instruments.**—Sterilization of instruments may be accomplished by soaking them in pure carbolic acid (95 per cent) for ten minutes or in a 10 per cent carbolic solution for thirty minutes. A safer plan is to boil them for five or ten minutes.

For boiling the instruments, a 1 per cent solution of **sodium carbonate (washing soda)** is preferable to plain water. It dissolves the **resisting capsule of bacteria** and destroys them more quickly (in five minutes boiling) **and also tends** to diminish rusting of instruments. Any kind of a pan, set on a stove or over an alcohol lamp or gas flame, will do for an instrument boiler. The ordinary fish-boiler of granite-iron makes a very good instrument sterilizer. A satisfactory simple boiler for instruments is shown in Fig. 176. Nicer and more convenient instrument boilers may be purchased as desired. There are a number of satisfactory patterns. The one shown in Fig. 177 has the advantage that the dressings for a small operation may be sterilized at the same time with the instruments.

In office or clinic work when through examining a patient, wash the instruments and drop them into the boiler and in a few minutes they are sterilized, ready to use for another patient or to be put away. Edged instruments, such as knives and scissors are more or less dulled by the boiling. Consequently when there is plenty of time, it is better to sterilize them by soaking them in carbolic acid or other suitable antiseptic. When a knife is put in with other instruments for sterilization the cutting portion should be wrapped with cotton.

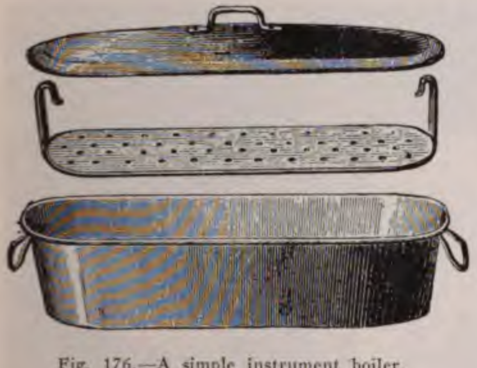


Fig. 176.—A simple instrument boiler.

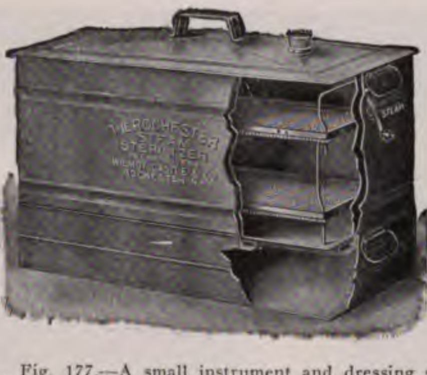


Fig. 177.—A small instrument and dressing sterilizer. The dressings for a small operation may be sterilized in the trays above the boiling instruments.

The instrument tray also must of course be sterile. It is contaminated every time a soiled instrument is laid back in it and unless disinfected may carry disease from one patient to another. To obviate this, each instrument after use may be laid on a clean towel (if it is to be used again during that examination) or dropped in a basin for later cleansing. Again, a light shallow pan may be used as an instrument boiler and instrument tray combined, the instruments being boiled in it each time before use. This gives, in a few minutes, sterile instruments in a sterile container.

3. **Do not Touch the Intrauterine Part of any Instrument.**—This rule should be very carefully observed, for in it lies one of the secrets of avoiding infection of the uterine cavity in office examination and treatment.

The hands may have been well disinfected or they may have been covered with boiled rubber gloves, giving a perfectly sterile covering, but in office work the field of examination has not been disinfected. The hands necessarily t h undisinfected surfaces and hence do not remain sterile. Consequently, ling an instrument for intrauterine work, it is important, even when wearing rubber gloves, to observe the rule not to touch that part of the instrument that is to enter the cervical canal. When bending the end of the uterine sound, dip a large piece of absorbent cotton in a reliable antiseptic solution and grasp the part to be moulded with that. If the uterine canal is to be cleansed with a cotton-wrapped applicator, use one of those previously prepared, as described under intrauterine treatment in Chapter III. If one must be prepared for immediate use, be sure to cleanse carefully the fingers that touch the cotton and also, before introducing the cotton, dip it in an antiseptic solution.

The other antiseptic precautions necessary in intrauterine exploration and treatment have already been given.

SOAP, BRUSHES, LUBRICANT

Soap.—Use some liquid preparation of green soap. The free use of such a soap is the most important step in hand disinfection. A number of excellent and convenient preparations of liquid soap have been put on the market by various firms, in drop bottles (Fig. 178, d) from which the soap may be dropped as needed without waste. Such a bottle may be filled with ordinary tincture of green soap (tincture sapo viridis) or any other required preparation, purchased in quantity or made up as desired. A still more convenient arrangement is the stationary holder for liquid soap, fastened just above the washstand.

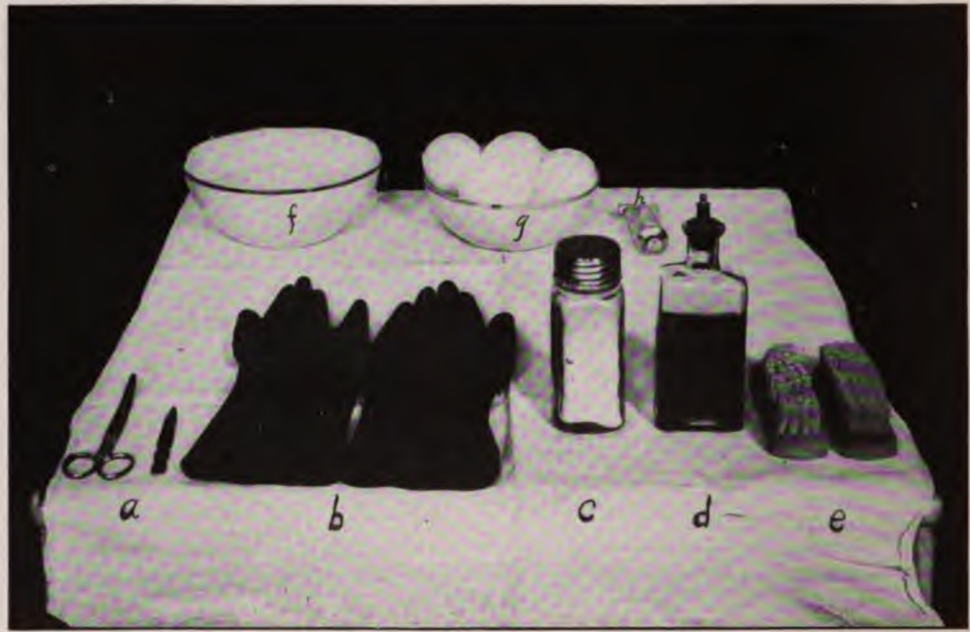


Fig. 178.—The articles needed for preparing for the gynecologic examination, arranged conveniently on a stand. *a.* Finger-nail instruments. *b.* Rubber gloves. *c.* Powder for dusting in rubber gloves, to make them slip on easily. *d.* Liquid soap in a drop-bottle. *e.* Hand brushes. *f.* Bichloride solution. *g.* Cotton balls. *h.* Lubricant in compressible tube.

Brushes.—For cleansing the irregularities about the fingers, a brush is necessary. The ordinary small hand-brush of vegetable fiber with a plain back (Fig. 178, e), does very well. Such brushes are cheap and will stand boiling and are effective as long as the fiber portion is uniformly stiff. When a brush becomes too soft from repeated boiling, it should be thrown away or laid aside to be used on surfaces where a softer brush is required.

A brush used in scrubbing the hands after examining an infected or doubtful case, must be boiled before being used again. It is convenient to have several brushes boiled and kept in a jar ready for use. They may be kept dry or in an antiseptic solution.

Lubricant.—A drop or two of liquid soap on the wet fingers or glove makes a most satisfactory lubricant. The smallest quantity lubricates thoroughly and is in a measure antiseptic and is easily removed. The author does not find glycerine satisfactory. Unless used in such large quantity as to be inconvenient, it does not lubricate well.

In the absence of liquid soap, any clean unirritating ointment will do. When an ointment is used, it is well to have it put up in a compressible tube (Fig. 178, h), for then the unused part is kept sterile.

USE OF RUBBER GLOVES

The author wishes to call attention to the routine use of rubber gloves in examination and office treatment. For ordinary office work, it is convenient to put them on dry. When a small amount of boric acid powder or talcum powder is dusted into each glove, it slips on easily. After the examination, the gloves are slipped off and thrown into a basin for subsequent boiling. Thus the infective material is kept away from the washstand as well as from the hands. After the office work is finished, water is poured into the basin of soiled gloves and they are boiled for ten minutes. It is well to have a towel in the basin to protect the gloves from injury by direct contact with the hot metal bottom and sides. After the sterilization, the gloves are taken out, cleansed in water to remove all foreign particles adhering to them, dried on a clean towel (being turned inside out often enough to secure good drying), dusted inside and out with a drying powder, wrapped in a clean towel, and laid away for subsequent use. When there is an examination or treatment requiring sterile hands, a pair of the rubber gloves is wrapped in a small towel and dropped into the water on top of the instruments, to be boiled with them.

Two or three pairs of rubber gloves, kept ready for use, constitute one of the best investments the practitioner can make, for the following reasons:

1. They protect the hands from syphilitic or other infection through some unnoticed crack or abrasion.

2. They prevent disagreeable odors clinging to the hands, as otherwise happens in vaginal examination in cases of advanced uterine cancer and in all rectal examinations.

3. They do away with the severe scrubbing of the fingers and hands, which is otherwise necessary after each examination or treatment of a patient with

any form of infection. This frequent severe scrubbing keeps the skin rough and in bad condition.

4. Boiling the gloves after use eliminates all danger of carrying contamination from one patient to another and keeps the infective material away from the washstand and other office fixtures.

5. When an absolutely sterile covering for the hands is desired, it is easily secured by boiling the gloves immediately before use.

AVOID UNNECESSARY EXPOSURE

In all the steps of the examination and in all examinations and treatments, avoid exposing the patient any more than is necessary. Do not let your study of the clinical and scientific features of the case so preoccupy your mind that you neglect this.

The carelessness manifested in this respect by some physicians is extremely reprehensible. This careless disregard of the natural modesty of the patient is seen both in private work and in clinic work but especially in the latter, where it is just as reprehensible as in the former. To the physician studying the difficult features of a case in an endeavor to save the patient's life or restore her to health, this may seem a small matter—but nevertheless it is an important one and should be considered. Furthermore, the poor patient, who in the clinic puts herself under the care of the teacher and his assistants, is just as much entitled to thoughtful consideration in this matter as the woman in better financial circumstances who comes as a private patient.

PRESERVATION OF SPECIMENS

The preservation of specimens for microscopic examination is a very simple procedure and yet in many doubtful cases, curettings or cervical polypi removed or pieces of tissue passed spontaneously, are thrown away or kept in such a manner that they are not fit for microscopic examination. Thus is lost a valuable aid to early diagnosis, in conditions where early diagnosis is important.

A good all-round preservative for these specimens is alcohol (95 per cent). It is nearly always at hand and it preserves the specimen indefinitely in good condition for microscopic examination. As soon as possible after removal and without unnecessary handling, the specimen is dropped into a small bottle containing the preservative and then forwarded to the pathologist.

A 10 per cent solution of formal is another good preservative. Formol, which is a 40 per cent solution of formaldehyde gas, is known also as formalin and as formaldehyde solution.

For particular points in the saving and transmission of curettings for diagnostic purposes, see previous pages (Curettage under Anesthesia).

EXAMINATION ON BED

When a patient is seen at her home, sick in bed, the methods of exploration employed are usually abdominal, vaginal, vaginoabdominal and, in some cases, rectoabdominal. A patient who is too sick to come to the office for a pelvic examination, is usually suffering, not with a superficial disturbance that can be seen by inspection of the external genitals or through a speculum, but with some deep-seated trouble, the nature of which can be determined only by deep internal palpation. In most cases of this kind the inspection of the genitals and the speculum examination add nothing of importance to the information otherwise obtained, and may be omitted.

In such a case, the abdominal examination is first made. The patient is directed to move to the edge of the bed and the clothing is loosened and pushed up and down, to expose the abdomen, and the knees are drawn up to relax the abdominal muscles (Fig. 179). The abdomen is then examined by the various methods previously explained.

The vaginal and vaginoabdominal examinations, with deep bimanual palpation, may be conveniently and satisfactorily conducted with but little disturbance to the patient by observing the following directions, some of which were partially carried out in arranging for the abdominal examination:

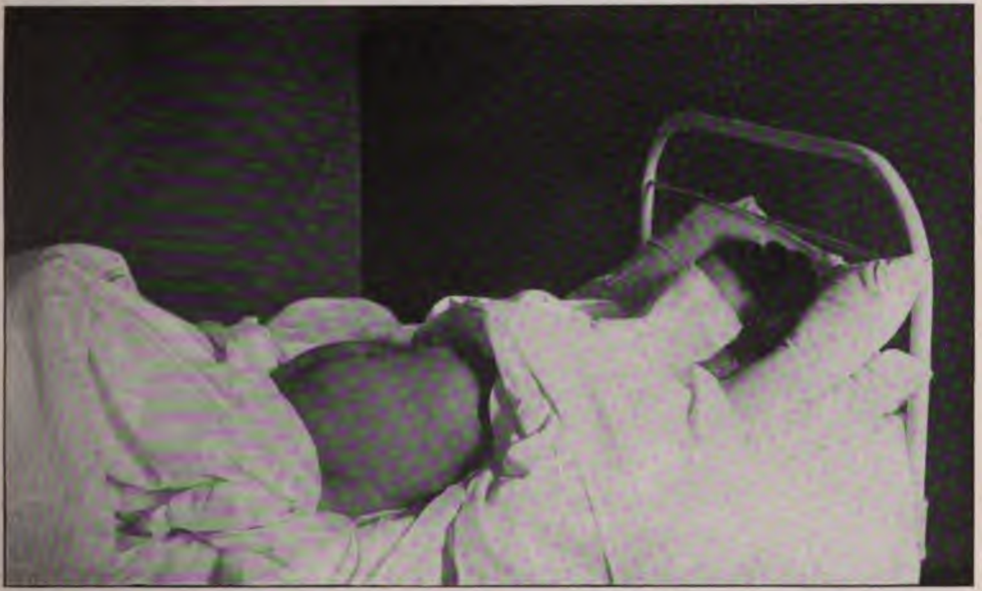


Fig. 179.—Patient arranged in bed for abdominal examination.

1. Direct the patient to move close to the left edge of the bed. There is but little disturbance—she lies just as she is in bed, except nearer the left edge (or the right edge, if the examiner uses the right hand for the internal palpation). A patient seriously sick, even with peritonitis, may usually be moved over sufficiently without much pain.

2. Remove the heavy bed-clothing, all except the sheet with perhaps a light blanket, and have the patient draw up both knees so that the feet are near the buttocks (Fig. 180).

3. Sit on the bed, or on a chair placed at the side of the bed, against the patient's left foot and direct the patient to separate the knees widely. The

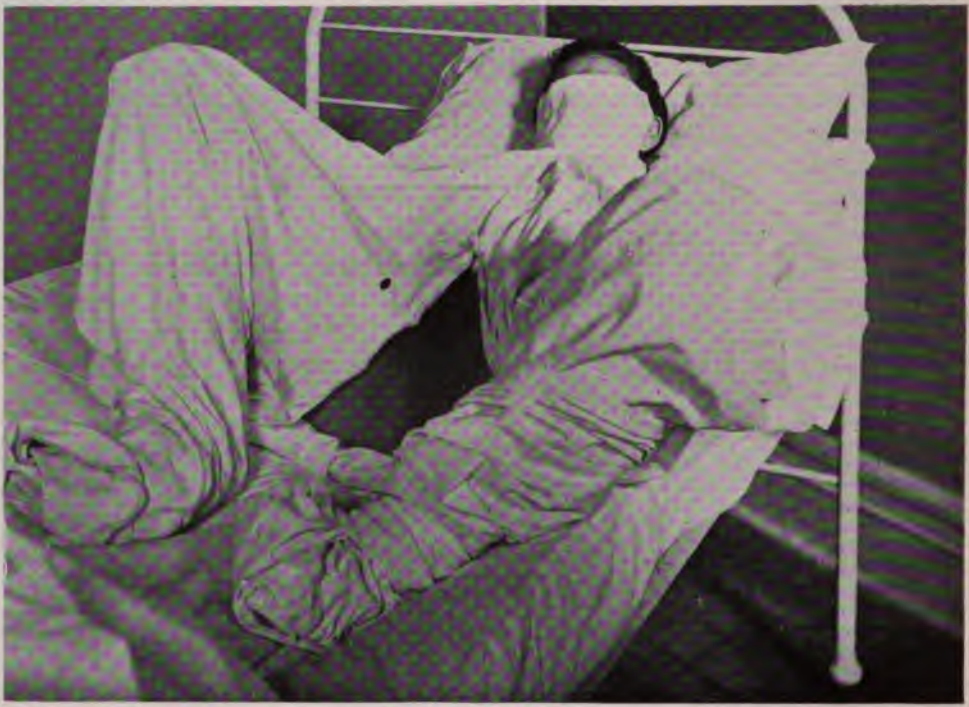


Fig. 180.—Patient arranged for vaginal examination in bed.

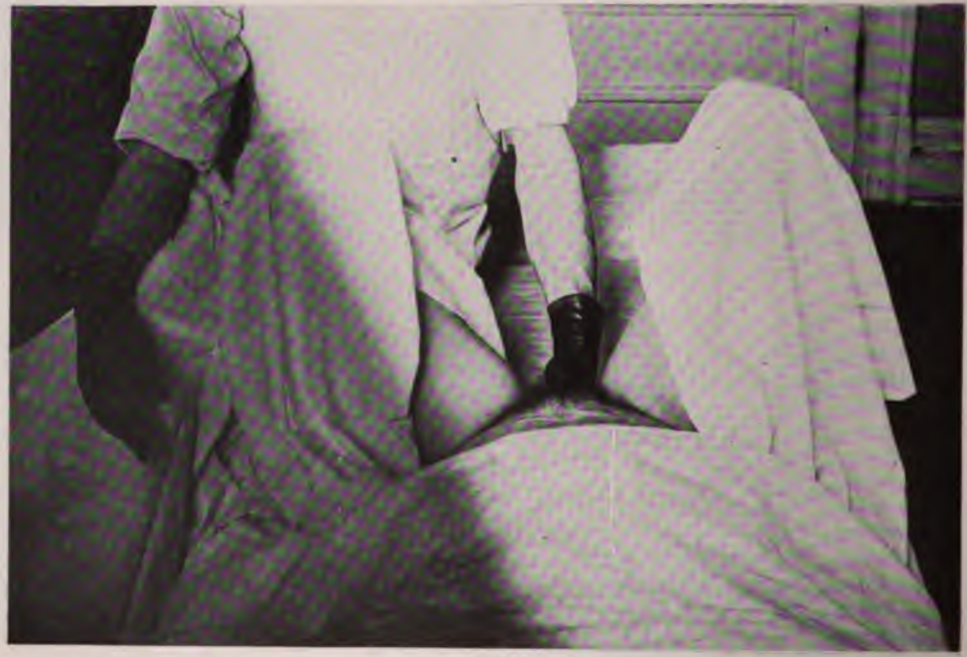


Fig. 181.—Position of examiner for accurate bimanual examination with the patient in bed. Showing the relations of the examining hand and arm. The examiner sits on the side of the bed and the arm lies *between* the widely-separated thighs, so that the examination is made from directly in front of the pelvis.

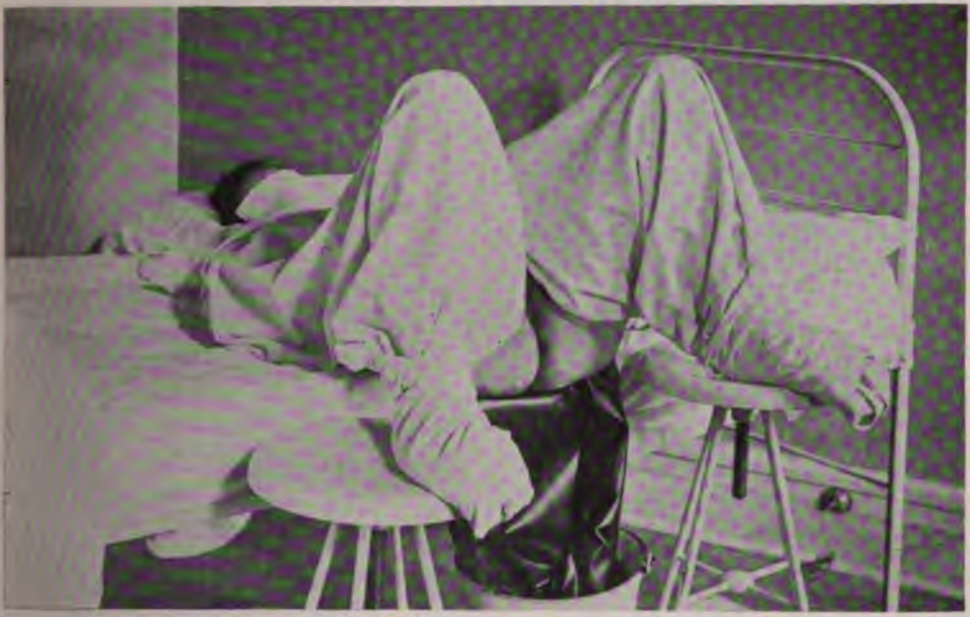


Fig. 182.—Regular "cross-bed" position. The patient is turned directly across the bed, with the hips resting on the edge of the bed and each foot on a chair.

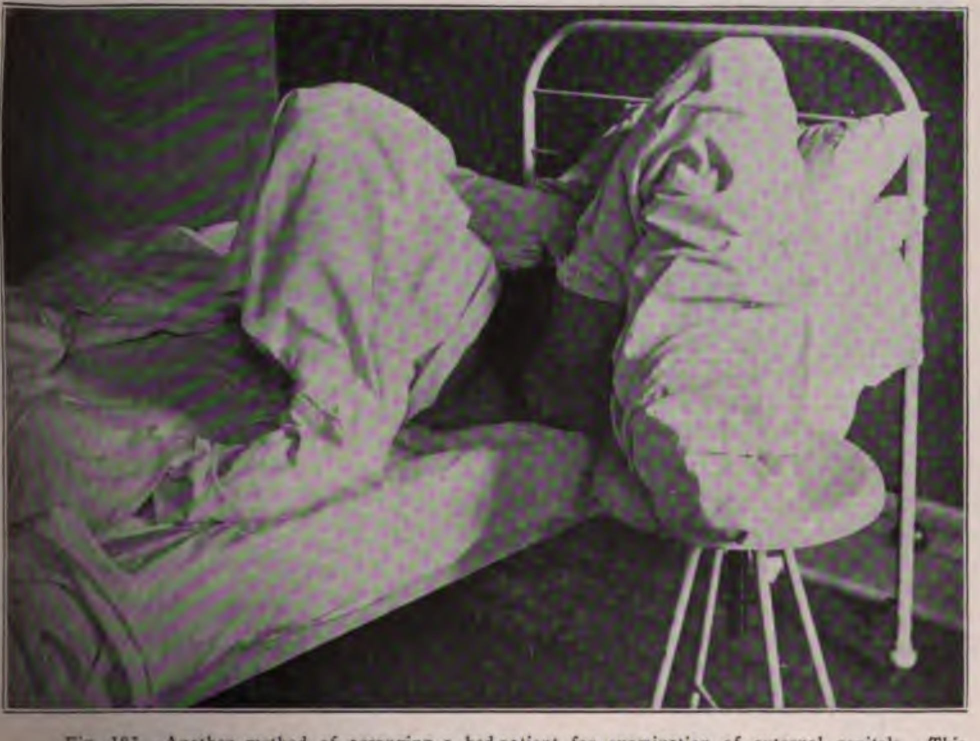


Fig. 183.—Another method of arranging a bed-patient for examination of external genitals. This is useful when the patient is very sick or when movement is painful. The hips are simply slipped to the edge of the bed and one foot placed on a chair.

sheet is then raised sufficiently to permit the examining hand (with the index and middle fingers well lubricated) to be passed **between** the patient's thighs (Fig. 181)—not under one thigh, as ordinarily directed. The hand is carried to the perineum and the examining fingers are introduced deeply into the vagina, taking care to depress the perineum sufficiently to allow their introduction without pain.

4. After the simple vaginal examination is completed, then the right hand is made to depress the abdominal wall into the pelvis as in the regular bimanual examination.

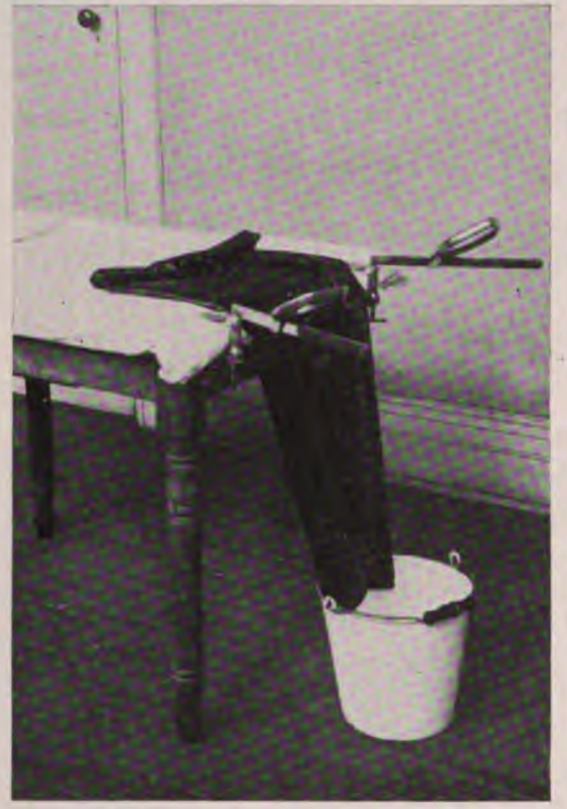


Fig. 184.—Kitchen table, with portable foot-rests attached ready for a gynecologic examination.

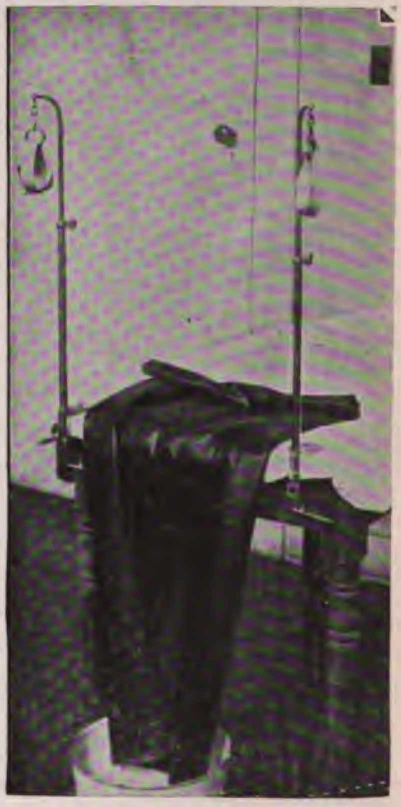


Fig. 185.—Kitchen table arranged with portable leg holders, for curettage or other vaginal operation.

The author calls special attention to the details given above because he finds that their accurate carrying out aids materially in securing needed information in deep-seated pelvic troubles. By following the directions closely, the examining hands and arms are made to occupy practically the same advantageous relation to the pelvis as in the regular office examination with the patient at the end of the table—that is, the examination is made from **directly in front** of the pelvis. The usual procedure of sitting on a chair beside the bed, with the examining arm passed under the thigh (instead of between the thighs) is much less effective when deep pelvic palpation is required.

While the examination steps above mentioned are generally the only ones required when the patient is sick in bed, there are some cases in which further examination is advisable. Whenever the patient complains of sores about the genitals or of itching or burning or profuse discharge, the genitals should be inspected in a good light. Likewise in any case in which it is thought that additional information of value may be obtained by the speculum examination, that procedure should be carried out.

For the inspection of the external genitals and for the speculum examination, the patient may be turned across the bed with the hips near the edge and each foot resting on a chair (Fig. 182). This is often referred to as the "cross-bed" position. If movement of the patient to this extent is likely to cause pain, she may be simply turned slightly and one foot placed on a chair while the other foot rests on the bed, as shown in Fig. 183.

Where a special gynecological examination is required at the patient's home, portable footrests may be attached to a plain kitchen table (Fig. 184). With these portable footrests are furnished also tall uprights for use as legholders, by which the feet and legs may be held out of the way during examination under anesthesia or during an operation. They are convenient for use where a minor operation must be done in the patient's home.

CHAPTER II

GYNECOLOGIC DIAGNOSIS

The diagnosis in any case is based upon the symptoms given by the patient and the signs found on examination. It should, as far as possible, be both an anatomic and a pathologic diagnosis—that is, it should state the location of the lesion and the character of the pathologic process.

Method of Diagnosis

Accurate diagnosis is much facilitated by a **grouping of diseases under certain prominent symptoms.** This is the natural method, the one that is followed unconsciously. The prominent sign or symptom in the case brings to mind a group of diseases, and then by the consideration of other ascertained facts, the diagnosis is narrowed down to one or two diseases. This differentiation should be made as one proceeds with the examination.

For example, suppose during an examination, an ulcer is found on the external genitals. Immediately arises the question, "Is this a chancroidal ulcer or a syphilitic ulcer or a tuberculous ulcer or a malignant ulcer or a simple ulcer?" Endeavor to settle the question then and there. Recall the facts in the history bearing on the differential diagnosis. Notice the characteristics of the lesion. Are there, in other parts of the body, evidences of syphilis or tuberculosis or malignant disease? Is there an irritating discharge, that could cause a simple ulcer?

Each important sign must be thus critically considered, and the habit of doing so should be assiduously cultivated. In a few cases the diagnosis is apparent from a few prominent facts, but in most cases, particularly in deep-seated and serious diseases, the diagnosis must be established by a **critical analysis** of the mass of information obtained in the history and examination. It is this critical analysis, this testing and elimination of diseases that do not stand the test, that makes the difference between the careful diagnosis and the snap diagnosis, between a real diagnosis and a guess, between a reliable diagnostician and an unreliable one.

This effective application of the signs to the diagnosis should, as far as practicable, be **made promptly and rapidly** as they are encountered in the examination. Though in a systematic history and examination, all the important facts are supposed to be obtained, yet if the application of the symptoms to the diagnosis is made as one proceeds, certain points of particular importance in the diagnosis in that case will be given the special attention which they require. Hence the importance of having mentally stored, and ready for immediate use, the diagnostic significance of the various facts brought out in the history and in the examination.

The following résumé of the diagnostic significance of certain signs and symptoms is given, not as a complete collection of the diagnostic points in the various diseases, but simply as a working plan for the rapid differentiation of the more common gynecologic affections and other conditions likely to be confounded with them. The rarer diseases and the less common diagnostic points and the conditions present in anomalous cases, may be found in the appropriate chapters.

POINTS IN THE ABDOMINAL EXAMINATION

In this examination the abdomen is, as already explained, subjected to inspection, palpation, percussion, and, in exceptional cases, to auscultation and mensuration.

The principal points of diagnostic importance in connection with the abdominal examination are, in the order in which they are encountered in the examination, as follows:

Prominence of Abdomen.
Movement of Abdominal Wall,
Discoloration of Abdomen,
Tension of Abdomen,
Tenderness of Abdomen,
Mass in Abdomen,
Area of Dullness in Abdomen.

PROMINENCE OF THE ABDOMEN

Decided prominence of the abdomen is due to many different affections, which may be conveniently arranged in five groups, as follows:

A. Some Affection of Abdominal Wall;
B. Something in Intestines;
C. Something in Peritoneal Cavity;
D. Some Enlarged Organ;
E. Tumor from Pelvis or Abdomen.

A. Abdominal Prominence from Some Affection of Wall

Obesity (Fig. 186).—There is evidence of fat deposit in other parts of the body. The abdominal wall may be picked up as a thick roll, and the fingers made to almost meet beneath (Figs 36, 37), showing that most of the prominence is due to the thickness of the wall. There is no distinct localized mass, like a tumor in the wall.

Percussion gives resonance all over the abdomen. Sometimes a distinct "fat wave" may be obtained, but it may be distinguished from a "fluid wave" by the expedient shown in Fig. 41, and also by percussion. In some cases, when the patient stands, a distinct roll of fat drops below the general abdominal contour, as shown in Fig. 187. Prominence from obesity has been mistaken for ovarian tumor, and also for pregnancy (Fig. 188).

-There is a distinct mass, which is superficial and moves

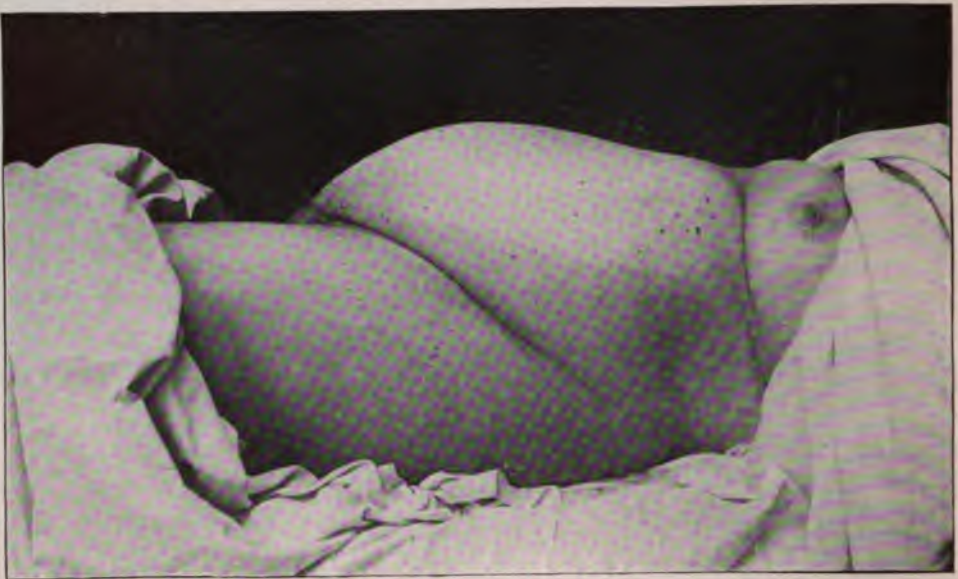


Fig. 186.—Obesity. The most prominent feature in this case is the marked obesity—see Fig. 187. There is also a fibroid tumor of the uterus and a small amount of ascitic fluid.

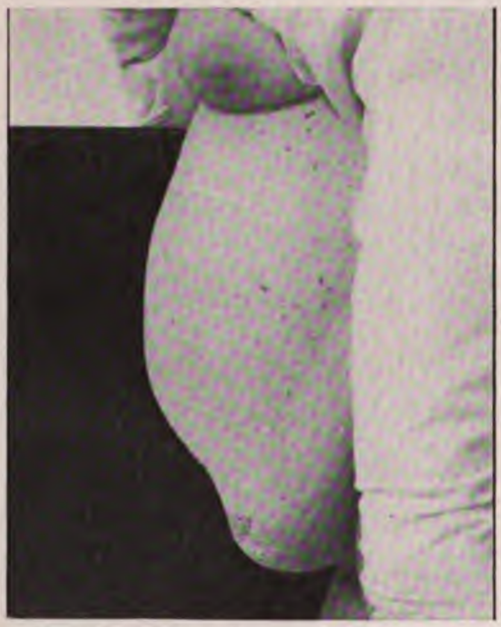


Fig. 187.—Obesity. Patient standing. Same patient as shown in Fig. 186. Notice the thick roll of subcutaneous fat that drops down below the general contour of the abdomen.

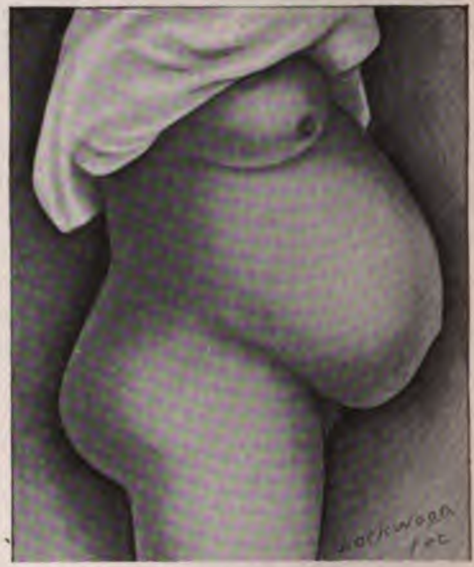


Fig. 188.—Obesity, mistaken for pregnancy by patient. (Williams—*Obstetrics.*)

with the wall and is apparently inseparably connected with it. The mass may be picked up and the fingers approximated beneath it. There is no apparent connection with any intraabdominal organ. There is dullness on light percussion, but resonance on deep percussion. Fig. 189 shows a tumor of the abdominal wall.

Inflammatory Mass in Wall.—Same as tumor with evidences of inflammation added—pain, tenderness, fever and, in some cases, redness and fluctuation.

Some years ago the author witnessed, as a visitor, an operation upon a supposed strangulated ventral hernia. The patient gave a history of a long-standing swelling some distance to the left of the umbilicus. This suddenly enlarged and became painful, the enlargement being accompanied by abdominal pain, vomiting, constipation and evidences of inflammation in the mass. The patient was brought before a medical class for operation. As the hernial site was evidently infected, it was decided to open the abdomen elsewhere and deal with the intestine through the clean opening. Accordingly the peritoneal cavity was opened by a median incision. Exploration showed that the peritoneal surface of the abdominal wall on the affected side was perfectly normal. There was no hernia. The trouble was an abscess of the abdominal wall, probably resulting from the suppuration of a tumor. A large operative opening into the peritoneal cavity in such close proximity to an abscess, made a very uncomfortable state of affairs for the surgeon, particularly as the abscess was so large and so near the surface that it was thought necessary to open it at once. It was opened as far as possible from the median incision.

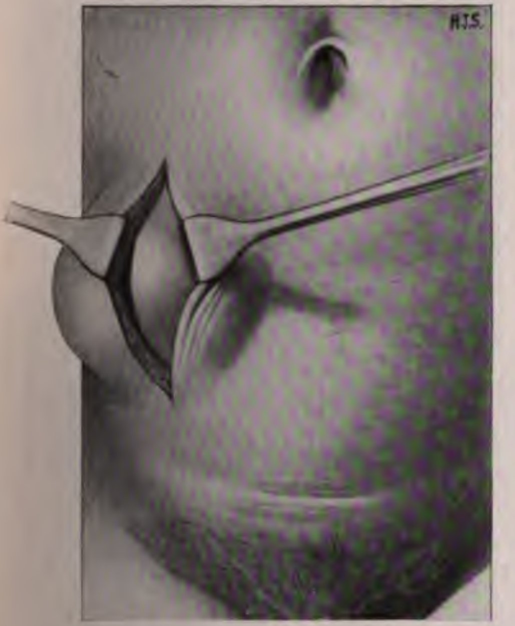


Fig. 189.—A tumor of the abdominal wall. (Montgomery—*Practical Gynecology.*)

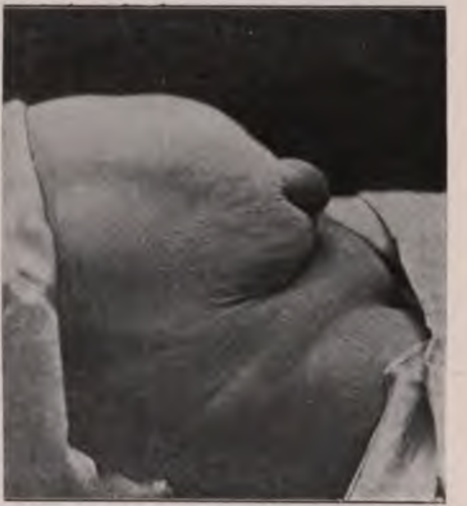


Fig. 190.—A small umbilical hernia, with a relaxed abdominal wall. (Hirst—*Diseases of Women.*)

Ventral Hernia.—There is a distinct localized protrusion, which is most pronounced when standing or sitting, and diminishes when the patient lies down. Coughing makes the mass prominent and gives a distinct impulse to it. The mass is resonant on percussion, when containing intestine, and is partially or wholly reducible. When the mass is reduced, the margin of the opening may be felt. Fig. 190 shows an umbilical hernia. When strangulated and so inflamed as to prevent satisfactory palpation, a ventral hernia may give much trouble in diagnosis, particularly if it contains only omentum.

Relaxation of Wall.—There is general protrusion of wall when sitting or standing, which largely disappears when patient lies down, unless tympanites is pronounced (Figs. 191, 192). On palpation the walls are lax and no abnormal mass is felt. The abdomen is everywhere resonant on percussion.

Separation of Recti Muscles.—The recti muscles are ordinarily held firmly together by the junction of the sheath of one side with that of the other side, forming a strong fibrous septum in the median line. In some cases of abdominal distention from pregnancy or a tumor, the tissue between the recti muscles is greatly stretched laterally and remains so. This gives a wide weak place between the recti muscles, in which the tissues are lax and thin (Fig. 193). When the patient raises her head and shoulders from the pillow, or otherwise makes strong intraabdominal pressure, there is bulging of this weak portion of the wall between the recti (Fig. 194). In such a case, the hand may be sunk deeply into the abdomen between the separated recti muscles (Fig. 195).

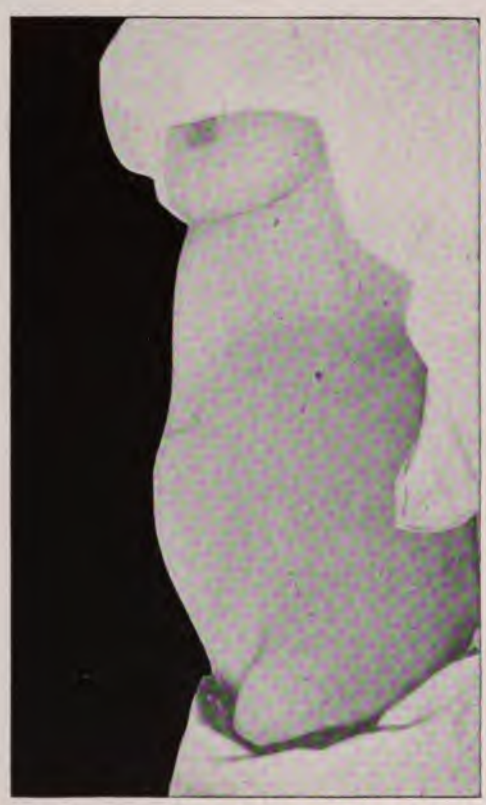


Fig. 191.—The contour of a relaxed abdominal wall, with the patient recumbent.

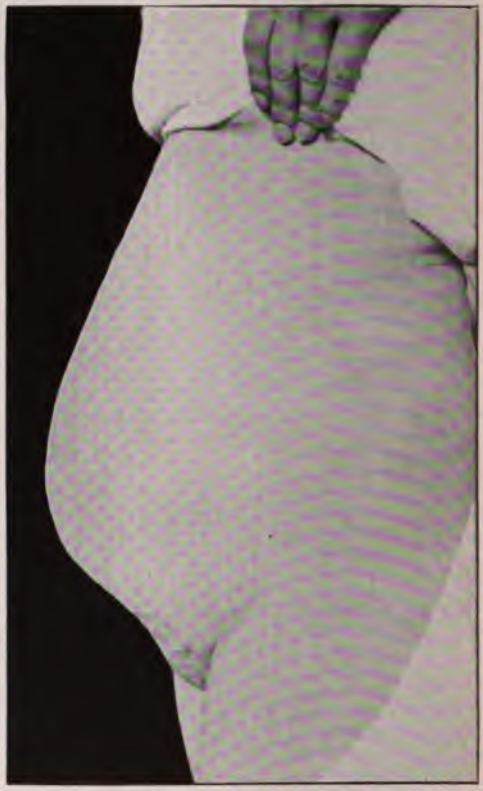


Fig. 192.—Same patient (Fig. 191), standing. Notice the marked projection of the relaxed abdominal wall.

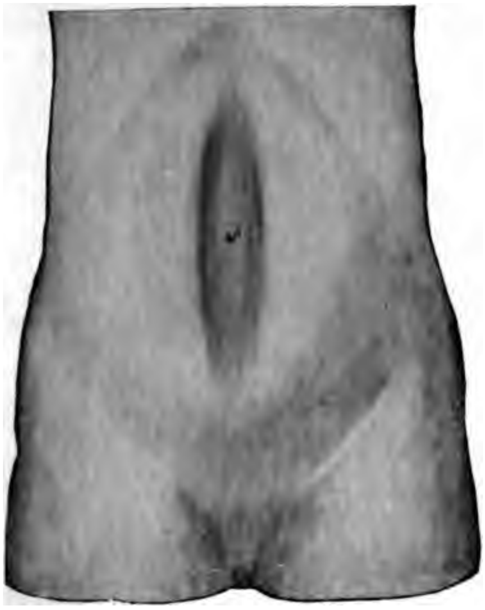


Fig. 193.—Median grooving of the abdominal wall where there is separation of the recti muscles. The woman is represented as lying on her back. (Webster—*Diseases of Women.*)

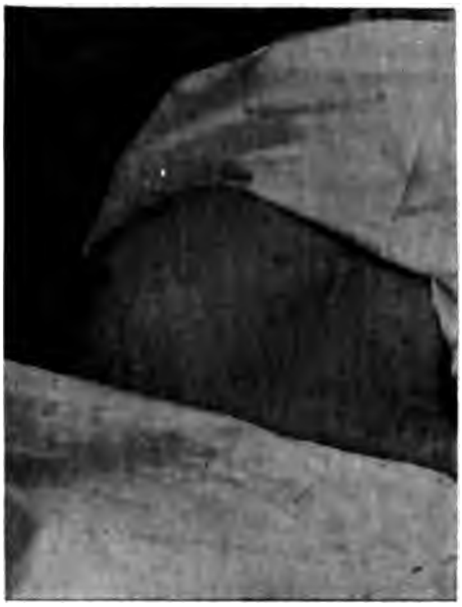


Fig. 194.—Patient with marked separation of the recti muscles. The illustration shows the marked bulging between the separated recti as the head and chest are raised from the table, the abdominal muscles being thus made to contract. (Webster—*Diseases of Women.*)

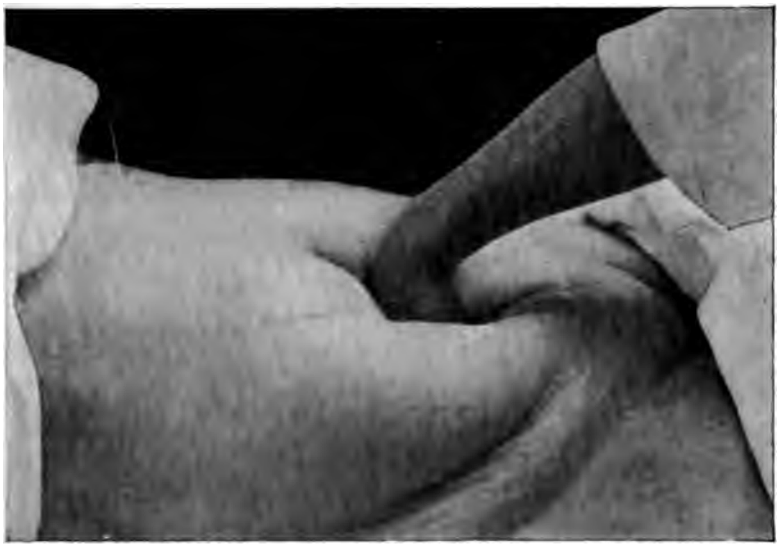


Fig. 195.—Patient with marked separation of the recti. The photograph from which this illustration **was made, was taken as** the upper part of the body was being raised from the table. The physician's **fist is buried in the gap** between the muscles, which are contracting. In this case there was pronounced **pendulous abdomen. As** the patient lay relaxed on her back, the distance between the muscles at the **level of the umbilicus measured** five and one-half inches. (Webster—*Diseases of Women.*)

B. Abdominal Prominence from Something in Intestines

anites).—Gas may cause marked prominence when associated **bdominal** wall. There is no distinct mass felt on palpation. Percussion shows hyperresonance over all the abdomen. There are usually symptoms indicating gastric or intestinal indigestion. Tympanites is frequently associated with enteroptosis. Fig. 196 shows tympanites which the patient mistook for pregnancy.

Fecal Impaction.—Fecal impaction may cause localized prominence in any part of the abdomen but it is usually situated along the course of the colon. The diagnosis depends largely on the exclusion of other causes of enlargement, the history of constipation and the effect of treatment directed toward clearing out the intestinal tract. Have the patient take a purgative until free bowel movements are secured, then a large enema and then return for another examination.

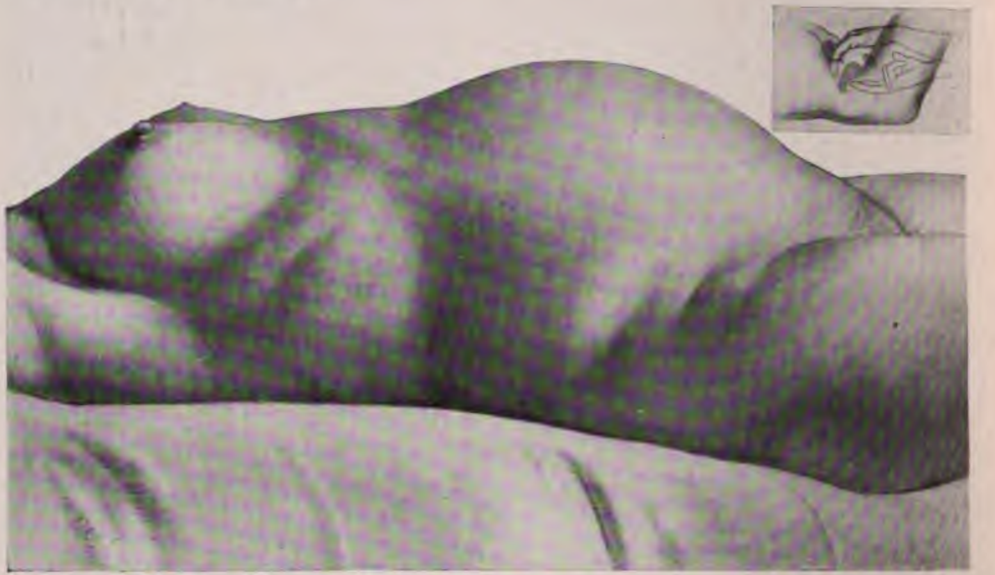


Fig. 196.—Tympanites, mistaken for pregnancy by the patient. The small figure in the upper corner shows the internal condition as determined by the bimanual examination, the uterus being of normal size. (Edgar—*Practice of Obstetrics.*)

C. Abdominal Prominence from Something in the Peritoneal Cavity

General Ascites.—General ascites may be slight (Fig. 197) or marked (Fig. 198). In ascites, i.e., free fluid in the peritoneal cavity, the abdomen is inclined to spread out at the sides and flatten at the top. There is usually a distinct fluid wave, obtained as previously explained (Fig. 40), which may be distinguished from a fat wave as shown in Fig. 41. When the patient is turned on the side or when she sits or stands, the area of dullness changes, because the fluid seeks the lowest part of the peritoneal cavity (Figs. 45 to 51). Another diagnostic point is that in some cases where there is free fluid in the peritoneal cavity, when the patient stands there may be decided protrusion of the umbilicus (Fig. 871), which protrusion disappears when the patient is in the recumbent posture.

Encysted Fluid (pus or serum or blood).—A distinctly limited collection of fluid, walled off or encysted, may be present in peritoneal tuberculosis also in abscess from salpingitis or appendicitis. There may be considerable solid exudate associated with the swelling, and also other evidences of inflammation, either septic or tuberculous. The diagnosis between the two forms of inflammation may usually be readily made from the history and the accompanying symptoms. Extrauterine pregnancy, like the inflammatory processes just mentioned, may present the evidences of encysted fluid. For the points in differential diagnosis, between extrauterine pregnancy and ordi-

mmation, see Chapter XI.

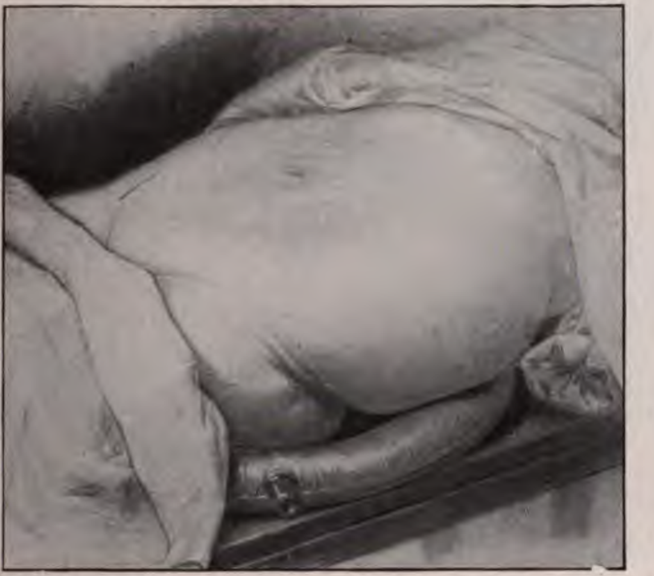


Fig. 197.—Ascites. A moderate amount of fluid in a relaxed abdomen. Notice how the abdomen spreads out at the sides. (Kelly—*Operative Gynecology*.)

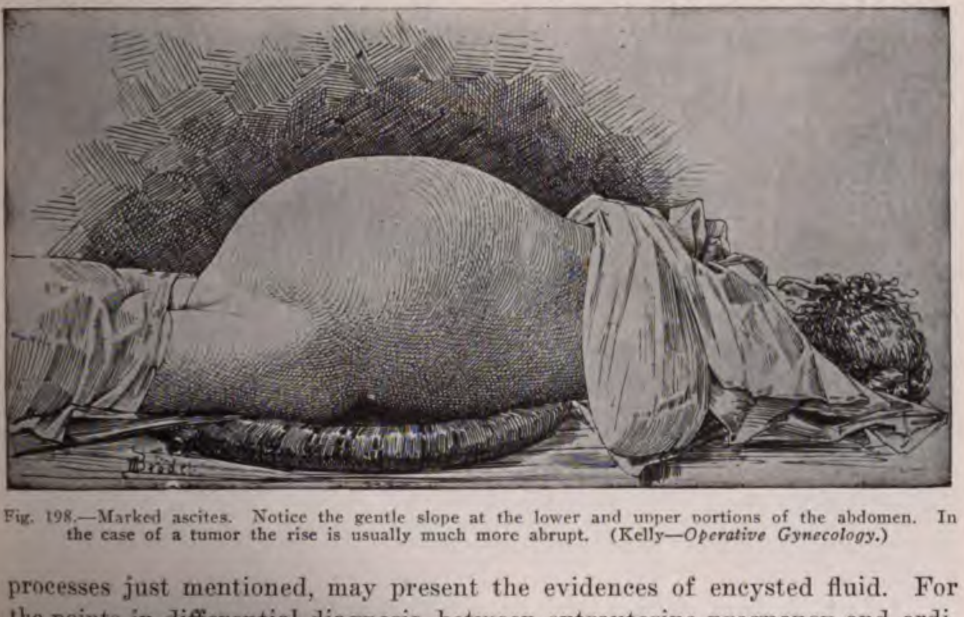


Fig. 198.—Marked ascites. Notice the gentle slope at the lower and upper portions of the abdomen. In the case of a tumor the rise is usually much more abrupt. (Kelly—*Operative Gynecology*.)

ser Omentum.—Following injuries of the pancreas or disease of the same, there may be a collection of fluid in the lesser peritoneal cavity, causing prominence of the abdomen and evidence of encysted fluid. The diagnosis is usually made during the progress of the operation. In all these cases of encysted fluid or solid exudate, there is dullness over that portion of the mass lying against the abdominal wall and resonance elsewhere.

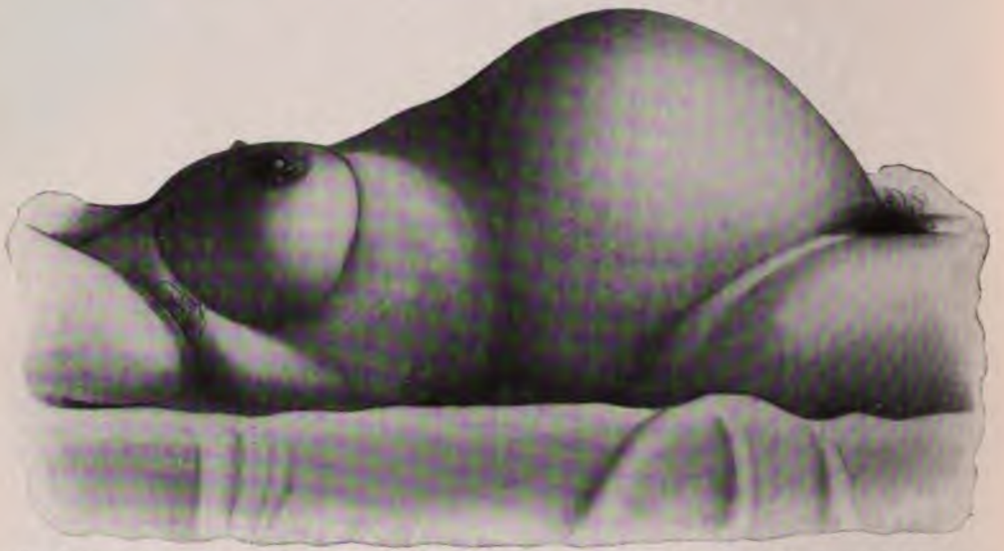


Fig. 199.—Contour of the abdomen in pregnancy, with patient recumbent. (Edgar—*Practice of Obstetrics.*)

D. **Abdominal Prominence from Some Enlarged Organ**

Uterus Pregnant (Fig. 199).—There is dullness over the mass and resonance at the sides (Fig. 46). There is no change of outline of dullness on change of position of patient. There are also the various signs of pregnancy, including the fetal heart sounds if the pregnancy is far enough advanced.

Bladder Distended with Urine.—The retention of urine to such an extent that the distended bladder produces a distinct prominence of the abdomen, happens occasionally in pregnancy with retrodisplacement of uterus (Fig. 200), in labor (Fig. 201), in pelvic tumors compressing the urethra and in certain nervous affections. There is dullness over the mass and resonance at the sides. There is usually a frequent desire to urinate, with the passage of only a small amount of urine. But there may be a constant dribbling of urine due to overdistention. If the bladder be emptied with a catheter the diagnosis becomes clear. Use a long soft-rubber catheter, as the ordinary female catheter may be too short to reach the entrance of the bladder, and if the catheter be not flexible it cannot follow the devious course of the distorted urethra. Patients have died from rupture of the bladder due to unrecognized overdistention (Fig. 200).

Spleen Enlarged from chronic malaria, leukemia or other cause.

Liver Enlarged from malignant disease, hypertrophic ci cause.

Gall-bladder Enlarged on account of occlusion of duct and distention with mucous secretion and inflammatory exudate. It sometimes becomes so much distended as to form a large cystic mass in the right side of the abdomen.

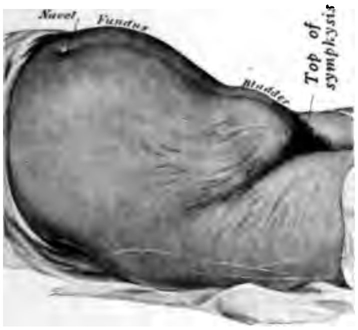


Fig. 200.—Contour of the abdomen in a case of distended bladder. The patient is in labor. Notice how well the bladder prominence stands out from the general abdominal prominence due to the pregnant uterus. (Norris—*American Textbook of Obstetrics.*)

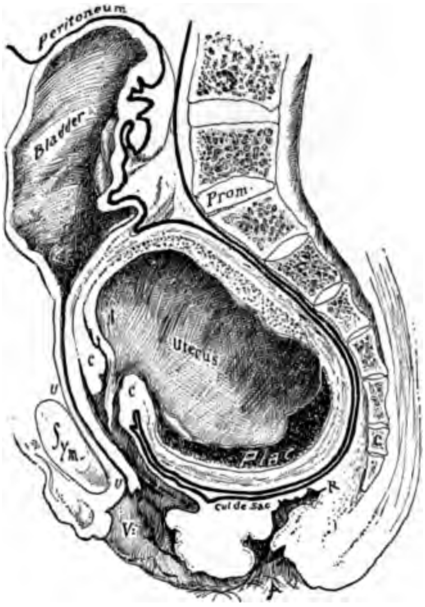


Fig. 201.—Frozen section of the body of a woman who died from rupture of a distended bladder. The cause of the retention of urine was a retroverted uterus four months pregnant. (Norris—*American Textbook of Obstetrics, from Arch. of Gyn.*)

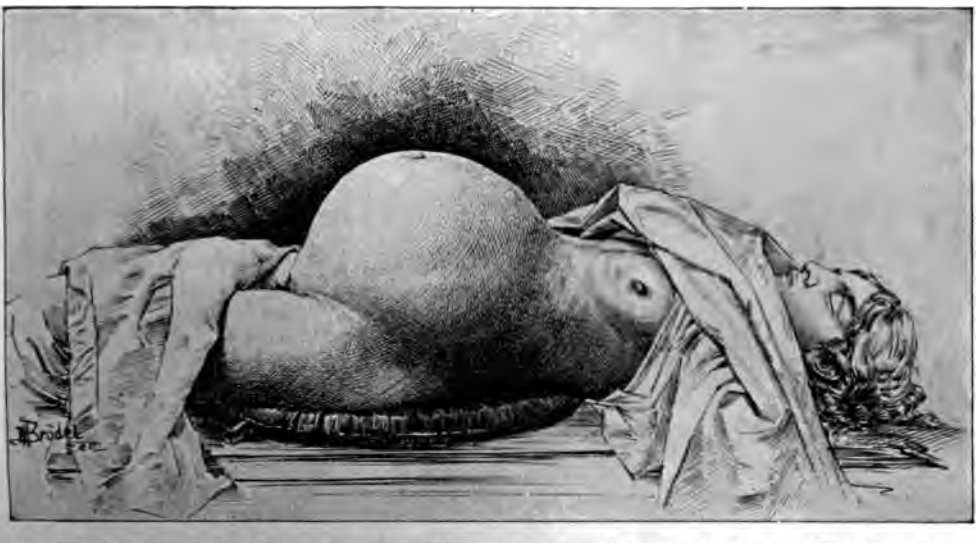


Fig. 202.—Contour of the abdomen in a case of large cystic tumor (parovarian). Notice the abrupt rise of the abdominal wall at both the lower and upper portions. (Kelly—*Operative Gynecology.*)

E. Abdominal Prominence from a Tumor

A Tumor Projecting up from the Pelvis (Figs. 202, 203).—Such a tumor has its point of attachment in the pelvis, the free margin of the growth extending upward into the abdominal cavity. The growth may be either cystic or solid. There is dullness over the mass and resonance at the sides (Fig. 50). There is no decided change of outline of dullness with change of position of patient, except where there is complicating ascites. There are found also the usual symptoms caused by the particular variety of pelvic tumor present.

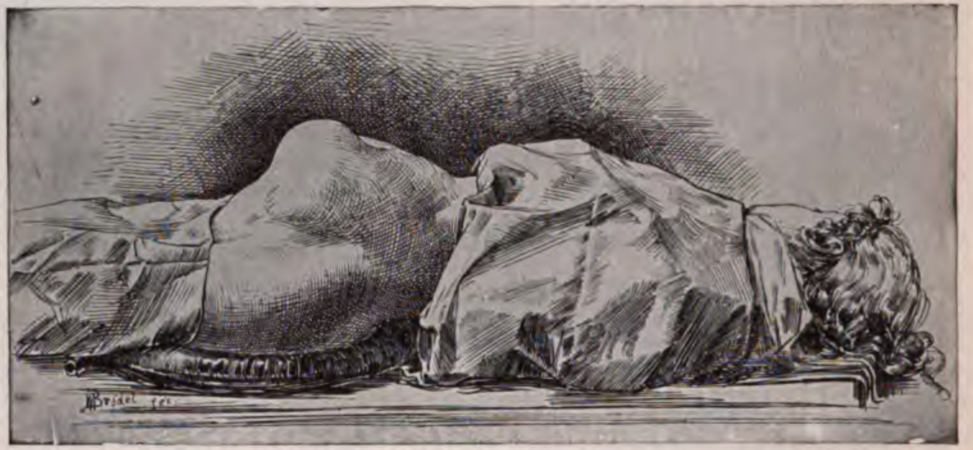


Fig. 203.—Contour of the abdomen in a case of large solid tumor (uterine myoma). The irregularity, so common in solid tumors, is well marked. (Kelly—*Operative Gynecology*.)

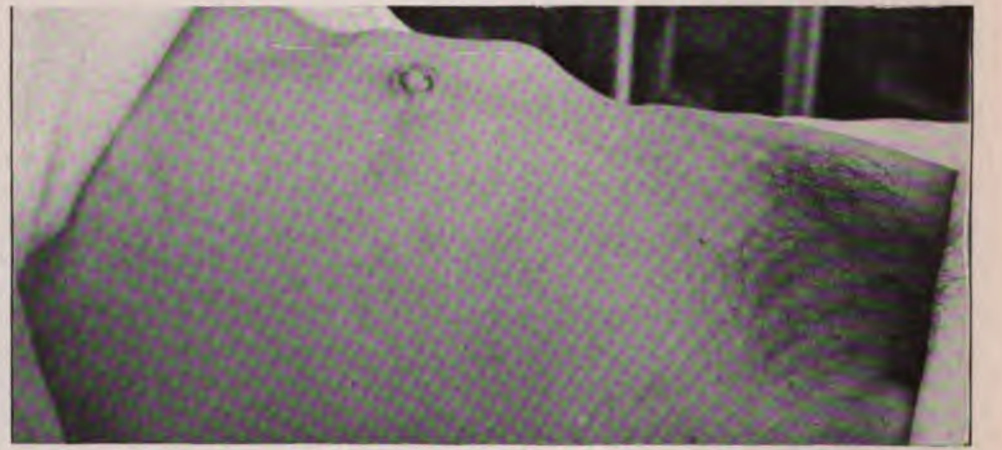


Fig. 204.—Contour of the abdomen in a case of retroperitoneal tumor (sarcoma). The projecting mass in the region of the umbilicus is well shown. The outline of the palpable mass and also the area of dullness are shown in Fig. 220. (Patient of Dr. Elsworth Smith, Jr., to whose kindness the author is indebted for this photograph.)

The ordinary new growths that project up from the pelvis are:

Myoma of uterus (Fig. 203).
Malignant tumor of uterus (carcinoma, sarcoma).
Cystic tumor of ovary (ovarian cyst, Fig. 202).

Cystic tumor of broad ligament (parovarian cyst).
Solid tumor of ovary (fibroma, carcinoma, sarcoma, papilloma).
Solid tumor of bladder.
Solid tumor of rectum.

A Tumor Connected with some Abdominal Structure.—Such a tumor has its point of attachment in the abdomen with the free margin of the growth extending toward, and sometimes into, the pelvic cavity. There is dullness over that portion of the mass lying against the abdominal wall and resonance elsewhere, unless there be associated ascites. There are symptoms also pointing to the organ affected and the nature of the growth.

The principal tumors that originate in the abdomen are:

Solid Tumors of the Cecum, Sigmoid, or other parts of the Intestinal tract (usually malignant).
Solid Tumor of the Stomach (usually malignant).
Solid Tumor of the Liver (usually malignant).
Solid Tumor of the Spleen.
Solid Tumor of Kidney.
Solid Tumor of Pancreas.
Solid Tumor of Retroperitoneal Structures (Fig. 204).
Cystic Tumor of Kidney.
Cystic Tumor of Pancreas.
Cystic Tumor of Omentum.
Cyst of Mesentery.
Pseudocyst of lesser Omental cavity.

MOVEMENT OF ABDOMINAL WALL

In certain cases some information may be obtained by watching the movements **of** the abdominal wall.

In painful affections within the abdomen, such as peritonitis or intraperitoneal hemorrhage or intestinal obstruction, the wall is held rigid to a considerable extent and the respiratory movements of the wall are very slight.

In the case of a **tumor splinting the wall,** the portion of the wall raised by the tumor remains stationary, while the remainder shows the respiratory movements.

It is important to know whether or not a **tumor moves with respiration.** As a rule a tumor of an abdominal organ moves up and down with the diaphragm in respiration, and this up and down movement may often be distinctly seen and felt through the wall at the lower margin of the growth or at the prominent part of the mass. If the tumor is firmly adherent to the wall, this movement under the wall cannot then take place. In some cases this fact may be turned to account in determining the presence or absence of adhesions. A growth from the pelvis does not move with respiration.

Movement of the child may sometimes be plainly indicated in late pregnancy by a prominence moving beneath the wall, due to an extremity moving from one part of the uterus to another and pushing out the wall as it moves.

Occasionally the **intermittent contraction** of a pregnant uterus may be noticed by its raising the wall as it becomes firmer and more prominent.

Pulsation of the abdominal wall may be due to an aneurysm. Not infrequently, especially in thin patients, the pulsations of the normal aorta are transmitted to the overlying wall, either directly or through an intervening tumor.

In some cases of intestinal obstruction or marked tympanites, a distinct **peristaltic wave** may occasionally be seen to pass across the abdomen in the course of the distended bowel. It is usually accompanied by a cramp-like pain.

DISCOLORATION OF ABDOMINAL SURFACE

Occasionally there is a well-marked central line of **pigmentation,** extending from the pubes to the umbilicus (Fig. 20). This is usually the result of a previous pregnancy.

Dilated Veins at the lower part of the abdominal surface, as a rule, mean that there is some mass compressing the intrapelvic veins.

Edema of the wall may be due to inflammation in the wall, or to heart or liver or kidney disease.

Striae (Fig. 14) from a former stretching of the wall, usually mean a former pregnancy continuing to near term, but they may come from any large tumor or from a former obesity of the abdominal wall. Such striae are occasionally seen on the thighs of patients who have been stout.

When the **wall is relaxed,** i.e., has been overstretched and has not regained its tone, it is very uneven and the skin appears wrinkled and corrugated. This folded redundant condition is nearly always present in decided enteroptosis.

The **eruption** of secondary syphilis (syphilitic roseola) is occasionally of decided help in determining the character of an atypical vulvar lesion. An eczema or other eruption near the site of a proposed operative incision, may necessitate postponement of the operation until the eruption is cured.

A **scar** indicates that there was at one time a burn or a blister or an area of ulceration of the wall or an injury of the wall or an operative incision.

TENSION OF ABDOMEN

Tension of the abdominal wall interferes very much with a thorough pelvic examination. It is due to one of the following conditions:

Fear or Timidity or Embarrassment, causing the muscular wall to be held tense. This tension usually disappears as the examination progresses and the patient sees that you are not going to cause pain. Even in very troublesome cases, relaxation of the wall may usually be secured by directing the patient to take a full breath and then let the breath all out. During expiration, when not forced, the wall relaxes and deep palpation may be made. In sinking the fingers into a region or about a mass for palpation, proceed gently and firmly and steadily toward the desired point, going a little deeper with each expiration. Do not gouge or jab or endeavor to reach the depths of a region by sudden forced movements. These all invite failure by causing reflex contraction of the abdominal muscles.

Inflammation, Local or General, beneath the wall causes tension of the overlying muscles. This tension is usually both voluntary and involuntary. The patient can relax the wall to some extent but not entirely, provided the inflammation is acute and severe. There is also marked tenderness over the affected area and other evidences of an inflammatory affection.

Mass, Solid or Containing Fluid.—If lying immediately beneath the wall this gives a sensation of tension or resistance to the palpating fingers. In exceptional cases, as in an extra large tumor or very marked ascites, the abdomen may be so filled that the outer abdominal wall is stretched and tense.

Hysteric Contraction of the muscular wall is sometimes seen. When taking place in an irregular way (part contracted and part relaxed) and associated with tympanitic distention and with marked hyperesthesia, it may cause the condition known as "phantom tumor," which has led to so many serious mistakes in abdominal diagnosis. The administration of a purgative to clear out the intestines and diminish the tympanites and of some nerve sedative to diminish the hyperesthesia and nerve irritability, may remove the tension sufficiently to admit of a satisfactory examination. If not, the patient should be examined under anesthesia, provided the symptoms are serious enough to make a positive diagnosis necessary at once. Under anesthesia the tension of the abdominal wall disappears, and deep palpation may be made in the affected region and the presence or absence of an abnormal mass determined.

TENDERNESS IN ABDOMEN

For the purpose of studying the significance of tenderness in the abdomen, it is convenient to divide the cavity into nine regions as previously explained (Fig. 29): the right, left, and central portions of the lower abdomen; the right, left and central portions of the upper abdomen; the right and left lumbar regions; and the umbilical region. In any of these, a local tenderness takes on particular significance. Again, there are certain diseases that cause a diffuse tenderness, extending throughout the whole abdomen.

Tenderness in Right Lower Abdomen (Fig. 205)

Tubal or Ovarian or Broad Ligament Disease (inflammation, tumor, extrauterine pregnancy). The tenderness is most marked low in the side near Poupart's ligament (tubo-ovarian region Fig. 207). It does not ordinarily extend to the appendix region though it may, in exceptional cases, involve both regions. A mass may be felt on vaginoabdominal palpation between the uterus and the pelvic wall. There is a history of uterine and pelvic inflammation or other pelvic disturbance.

Appendicitis.—Tenderness is most marked about the middle of a line drawn from the right iliac spine to the umbilicus (McBurney's point, Fig. 206, 208). By sinking the fingers deeply into the abdomen near the umbilicus and then carrying them outward toward the iliac spine, the appendix may often be felt to roll under the fingers as a tender cord. There is usually a history of stomach or bowel disturbance and of attacks of pain radiating about the umbilicus and finally settling down in the appendix region.

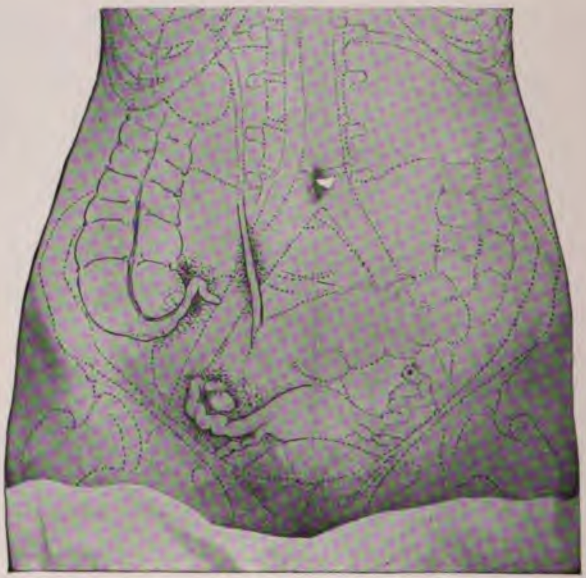


Fig. 205.—The right lower abdomen. The organs commonly affected and the areas accordingly of particular interest, are indicated by the stippling.

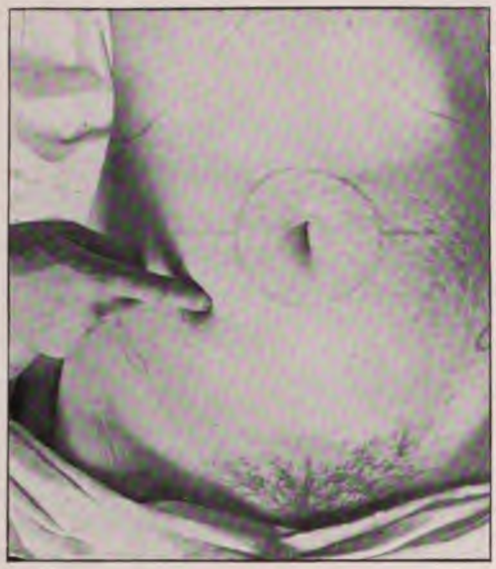


Fig. 206.—Indicating the point to seek for appendix tenderness.

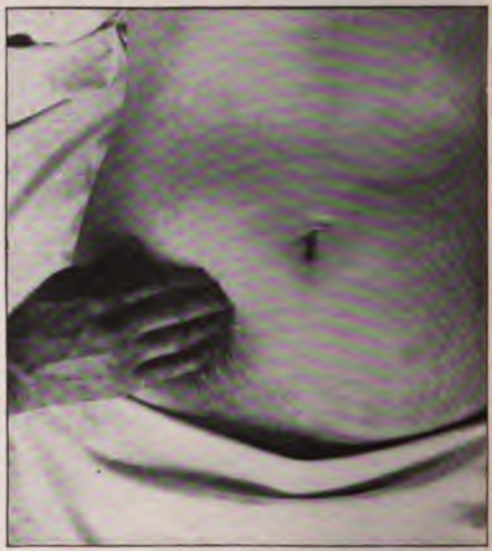


Fig. 207.—Palpating for the appendix itself, to determine whether or not there is any appreciable infiltration and thickening of it. When thickened, the appendix is felt as a small tender roll, deeply placed.

Some Disease of the Cecum or Ascending Colon.—Inflammation, tumor and intussusception are the more common affections of the cecum. They present much the same local signs as mild appendicitis. The tenderness and the mass are not localized to the appendix region, however, but extend up along the ascending colon.

Ureteritis.—There is a painful point over the ureter (Fig. 209) and tenderness extending up and down the course of the same. There is usually pain extending from the kidney along the ureter, to the bladder. There is nearly always decided tenderness over the kidney (Figs. 210, 211, 212).

Movable Kidney.—A rounded mass is felt on deep palpation in or near the appendix region. It is somewhat tender. It is movable and may be displaced upward into the kidney region. Special methods for palpating same are shown in Figs. 38 and 39. There is a history of irritable bladder, particularly when standing or walking. There may be pain radiating from the kidney region along the ureter to the bladder. The urinary findings will indicate whether or not there is inflammation or irritation along the urinary tract.

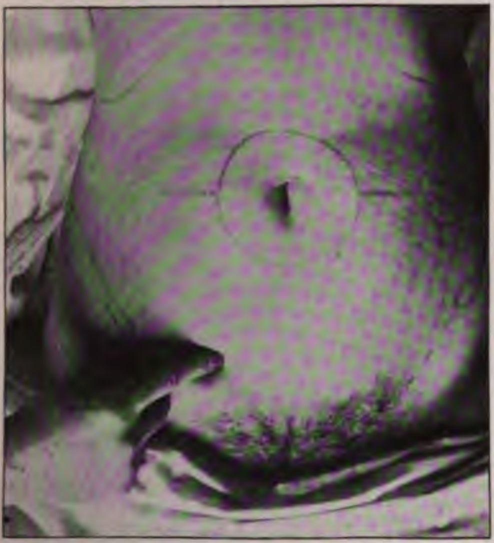


Fig. 208.—Palpating for the appendix itself, to determine whether or not there is any appreciable infiltration and thickening of it. When thickened, the appendix is felt as a small tender roll, deeply placed.

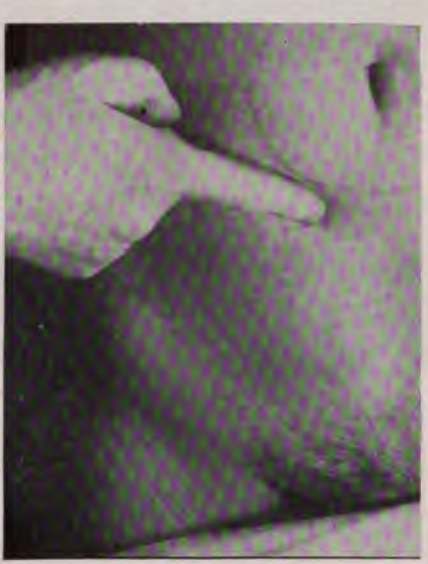


Fig. 209.—Indicating the site to search for tenderness of the right ureter.

Kidney Disease, for example, a tumor or tuberculosis or inflammation, may cause tenderness extending from the kidney down into the right lower abdomen. Kidney disease is indicated by tenderness and enlargement found in palpation, and by the urinary findings.

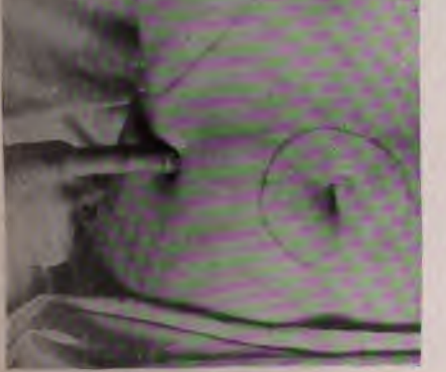


Fig. 210.—Indicating the region for kidney tenderness in front, on the right side.

Intestinal Disease.—Painful diseases of the small intestine, either acute or chronic, may give rise to tenderness in the right lower abdomen.

Tuberculous Peritonitis and other forms of peritoneal disease occasion tenderness here, when extending to this region.

Nervous Affection.—Various organic and functional nervous diseases cause marked hypersensitiveness of the abdominal surface and of the intraabdominal structures. The pain complained of is out of proportion to any obvious sign of disease. By palpating over the abdomen it is found that there is tenderness everywhere, even up on the chest walls. Pinching up the skin may cause almost as much pain as the pressure on deeper structures. General observation of the patient will show that she is nervous. Special examination will show evidence of neurasthenia, hysteria or other disease of the nervous system.

Tenderness in the Left Lower Abdomen

The affections that cause tenderness in the left lower abdomen are the same as those just given for the right lower abdomen, substituting the sigmoid flexure and the descending colon for the appendix, cecum and ascending colon.

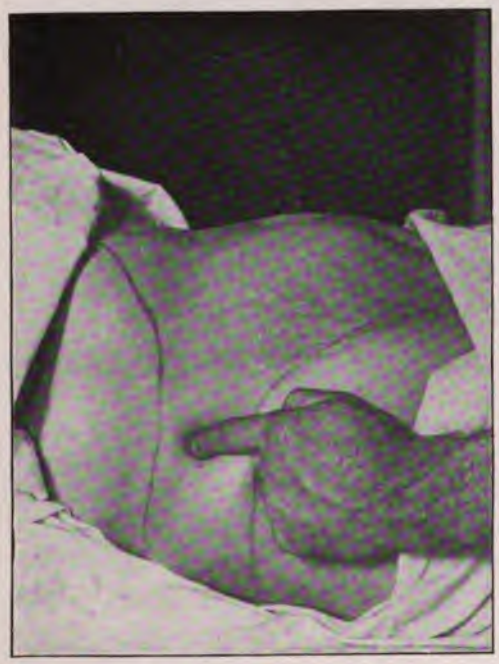


Fig. 211.—The point for kidney tenderness laterally.

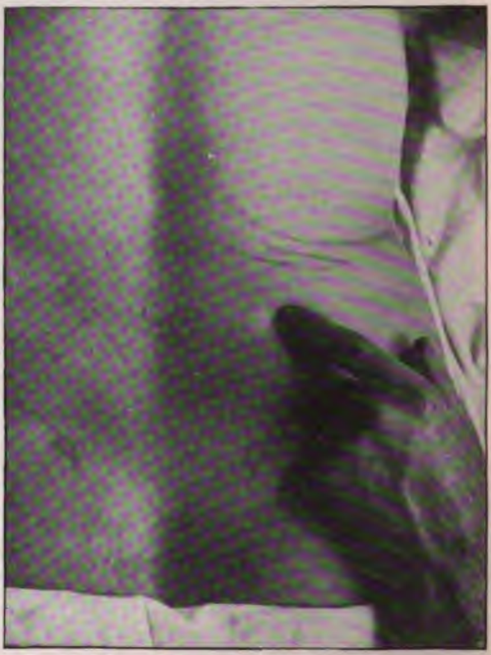


Fig. 212.—The point for kidney tenderness posteriorly.

Tenderness in the Central Lower Abdomen

Intestinal Disease.—There are many affections of the intestines that give pain on pressure in the central lower abdomen, for example, ordinary enteritis, mucous enteritis, tuberculous enteritis and typhoid fever. The tenderness is widespread, usually extending into the upper part of the abdomen. There are also the gastrointestinal symptoms that accompany these diseases and, in addition, the symptoms and signs peculiar to each disease.

Inflammation of Uterus.—The tenderness is confined to the central part of the lower abdomen and is elicited usually only by deep pressure. There are also the various special evidences of uterine inflammation.

Pelvic Inflammation.—Pelvic inflammation in any form is likely to give rise to tenderness extending throughout the lower abdomen. Even if the inflammation is confined strictly to the tube on one side, there is usually some tenderness on pressure in the median line. There is a history of pelvic inflammation, with characteristic tenderness of the affected adnexa in the bimanual examination, and perhaps also a distinct mass.

Bladder Disease.—The tenderness is very low, just above the pubes. There is a history of frequent, painful urination. Pressure on the affected region may cause a desire to urinate. Examination of the urine will show evidences of bladder or kidney disease.

Tuberculous Peritonitis.—This tenderness is widespread over the abdomen. There is encysted fluid or a mass of exudate or general ascites. The trouble is usually chronic. There may be evidence of tuberculosis elsewhere (lungs, intestines). There is no apparent focus of ordinary infection, such as salpingitis or appendicitis.

Tenderness in Right or Left Lumbar Region

Renal and Suprarenal Affections are the pathologic conditions peculiar to the lumbar regions, and the usual causes of tenderness there. Fig. 211 indicates the point in the lateral lumbar region to make pressure for kidney tenderness, and Fig. 212 shows the point posteriorly. In palpating for a mass in the same region, one hand may be placed behind and the other in front so as to catch the structure between the palpating fingers (Figs. 38 and 39).

Tenderness in Right Upper Abdomen

Diseases of the Gall Bladder or of the Liver are the common causes of tenderness in the right upper abdomen, the usual condition being cholelithiasis or hepatitis or tumor of the liver. Fig. 213 indicates the point to seek for gall bladder tenderness. It may be found anywhere from the point indicated by the finger outward to the costal margin. Occasionally an affection of the pyloric end of the stomach or of the duodenum or of the hepatic flexure of the colon or of the right kidney, causes tenderness extending well into the right upper abdomen. But in practically all these conditions the tenderness may be traced out of this region and for a considerable distance along the organ affected.

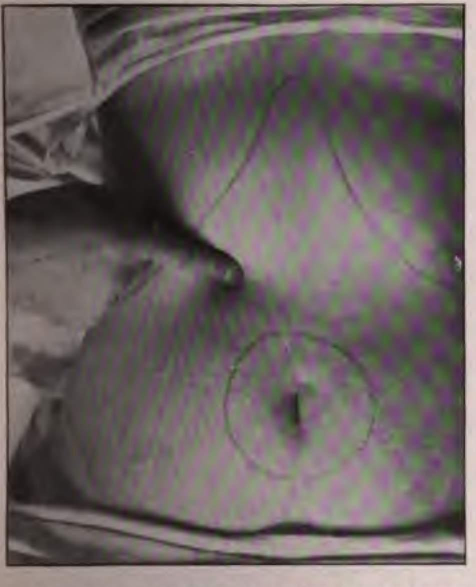


Fig. 213.—Indicating the region for tenderness or a mass due to gall bladder or duodenal disease.

Tenderness in Left Upper Abdomen

Diseases of the **spleen** or of the splenic flexure of the **colon** or of the cardiac end of the **stomach** or of the left **kidney** or **suprarenal capsule,** are the usual causes of tenderness in the left upper abdomen. The left hypochondriac region is the area for splenic tenderness. The dragging pain from an enlarged spleen is usually referred by the patient to this area.

Tenderness in Central Upper Abdomen

Tenderness in this region is usually due to an affection of the **stomach** or of the **liver.** In doubtful cases, when there is so much widespread tenderness that there is uncertainty as to whether it is from the stomach or the liver, remember that stomach disease is often accompanied by attacks of pain under the left shoulder-blade while liver disease is frequently accompanied by pain under the right shoulder-blade. Less frequently, tenderness in the region is due to disease of the **pancreas** or to some affection of the **peritoneum.**

Tenderness in Umbilical Region

Diseases of the **small intestine** and diseases of the **peritoneum** and **omentum,** are the usual causes of tenderness localized in this region. In the lower outer portions of the region the ureters encroach, and may cause point tenderness on one or both sides (Fig. 209).

Diffuse Tenderness Throughout Abdomen

The usual causes of this are general peritonitis, tuberculous peritonitis, gastroenteritis, neurasthenia and hysteria. Appendicitis, gastritis and many other conditions give rise to tenderness or pain which is diffuse at first, but it soon becomes distinctly localized.

MASS FELT ON ABDOMINAL PALPATION

The masses of particular interest in gynecologic diagnosis are those situated in the lower abdomen. For exact differential diagnosis these are preferably taken up later. Consequently here the author will simply indicate by name the various masses found. It must be kept in mind, however, that in addition to the various masses that may originate in any region, masses from elsewhere may be found in that region, because of growth or displacement or both. In Fig. 35 the arrows indicate the usual direction of growth, or displacement, of a tumor of the various organs outlined.

Mass Felt in Right Lower Abdomen (Fig. 205)

Tubal Inflammation (salpingitis, pyosalpinx, hydrosalpinx).
Tubal Pregnancy.
Tubal Tumor (adenomyoma).
Ovarian Inflammation (oophoritis, ovarian abscess, cystic ovary).
Ovarian Tumor (cystic, solid).

Parovarian Tumor (cystic).
Myoma of Uterus.
Appendiceal Inflammation or Tumor.
Tumor of Cecum.
Movable Kidney or Tumor of Kidney.

Mass Felt in Left Lower Abdomen

Here are found the same conditions as described for the right side, substituting sigmoid flexure for cecum and appendix.

Mass Felt in Central Lower Abdomen

Pregnant Uterus.
Myoma of Uterus.
Malignant Tumor of Uterus.
Distended Bladder or Tumor of Bladder.
Pelvic Inflammation with Exudate.
Pelvic Tuberculosis.
Tubal Pregnancy.
Ovarian or Broad Ligament Tumor, growing in from the side.
Appendiceal, Cecal, Sigmoid or Kidney Mass, extending in from the side.
Occasionally, Spleen, Liver, Gall Bladder, Stomach, Pancreas or Peritoneal Masses, extend into this region.

Mass Felt in Right Upper Abdomen

Enlarged Liver.
Enlarged Gall Bladder.
Abscess of Liver.
Tumor of Liver.
Tumor of Heptic Flexure of Colon.
Tumor of Pyloric End of Stomach.
Tumor of Duodenum.
Tumor of Kidney.
Abscess of Kidney.
Tuberculosis of Kidney.

Mass Felt in Left Upper Abdomen

Enlarged Spleen.
Tumor of Spleen.
Abscess of Spleen.
Tumor of Cardiac End of Stomach.
Tumor of Splenic Flexure of Colon.
Tumor of Kidney.
Abscess of Kidney.
Tuberculosis of Kidney.

Mass Felt in Central Upper Abdomen

Tumor of Stomach.
Tumor of Left Lobe of Liver.
Tumor of Pancreas.
Tumor of Duodenum.
Tumor of Transverse Colon.
Fecal Impaction in Colon.

AREA OF DULLNESS IN ABDOMEN

An area of dullness in the abdomen indicates that **something solid or fluid** is lying against the abdominal wall, pushing the intestines away or flattening out the intestine between the mass and the wall. When an area of dullness is found in percussing over the abdomen, the first thing to do is to **ascertain its exact outline.** The getting of the shape of the area clearly in mind is much facilitated by outlining it, wholly or partially, with a lead pencil or other marker. This outlining of the area shows in what region or regions it is situated, and also shows whether or not it is of such position and size and shape as would be likely to be caused by the enlargement of any adjacent organ. In some cases the employment of both superficial and deep percussion may aid some in differential diagnosis (Figs. 42, 43).

Then determine whether the area of dullness can be **shifted by pressure**—by attempting to push about any mass that may be in the abdomen.

Then determine whether the outline of the dullness **changes with the position** of the patient. For example, mark out the area with the patient lying on the back, then have her turn on one side and mark it in that position. Then have the patient stand, if she is able, and mark the outline of the dullness in that position. This is of much importance in the diagnosis of free fluid in the peritoneal cavity.

An **area of dullness** where there should be resonance **may be due to** any of the following conditions:

An enlarged organ—for example, the bladder distended with urine (Fig. 44), a pregnant uterus or other median mass (Fig. 46), the liver enlarged from various causes (Fig. 214). The dullness extends to the region normally occupied by the organ. It has about the shape to be expected in symmetrical or asymmetrical enlargement of the organ in question. There are other evidences of disease of that organ. There is nothing else found to account for the dullness. Each of these points should be considered when endeavoring to ascertain whether or not a mass is due to enlargement of some particular organ (Fig. 215).

Free Fluid in Peritoneal Cavity (Ascites).—In this condition the fluid of course seeks the lowest part of the peritoneal cavity, being drawn there by gravity, and the upper margin of the fluid, represented by the upper margin of the area of dullness, is approximately horizontal. As the patient changes position, the fluid changes its relative position, to conform to the law just given—hence the change in the outline of the area of dullness, which is so characteristic in these cases. To illustrate the application of this law, take a case of moderate ascites. With the patient on her back the dullness would be as represented by the dark area in Fig. 216, with a corona of resonance about the umbilicus, which is the highest point. Fig. 49, which represents a cross section of the body in such a case, explains the cause of the dull and resonant areas. Fig. 48 shows the contrasting condition produced by a tumor, and the area of surface dullness produced by the same is indicated in Fig.

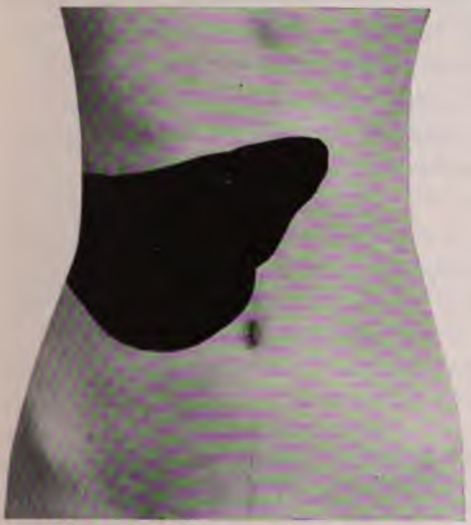


Fig. 214.—Indicating the region for dullness from enlarged liver.

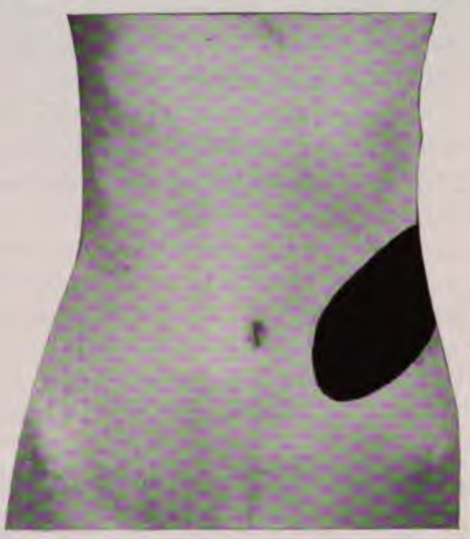


Fig. 215.—Indicating the region for dullness from enlarged spleen.

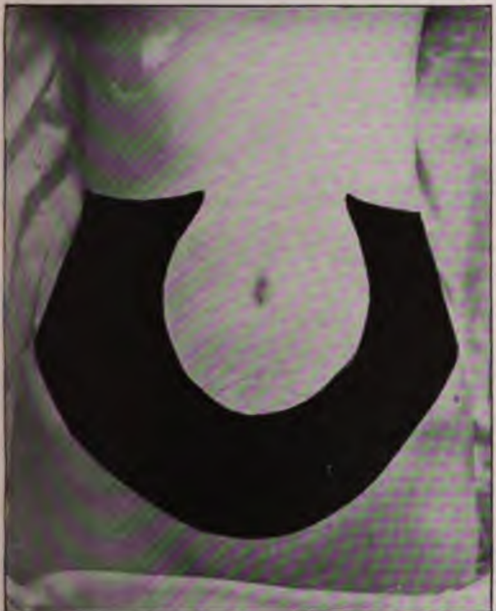


Fig. 216.—Indicating the area of dullness in moderate ascites, with the patient lying on her back.

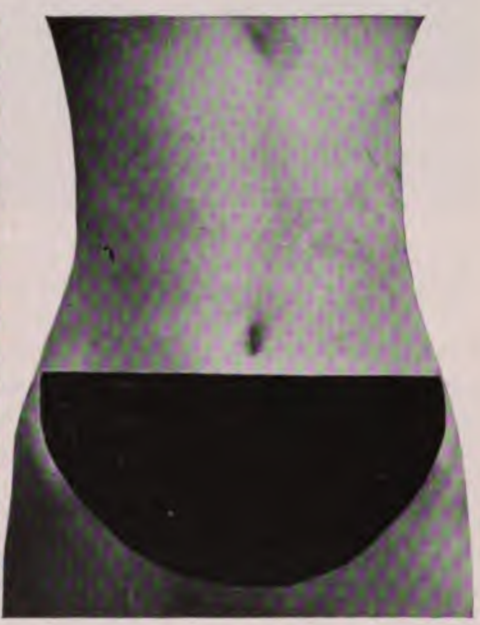


Fig. 217.—Indicating the area of dullness in moderate ascites, with the patient standing.

46. When the patient with ascites turns on her side, the fluid shifts as indicated in Fig. 51 and the area of dullness changes to the lower portion, the upper flank becoming resonant. When the patient stands, the fluid again shifts, seeking the lowest part, and the outline of dullness changes to that shown in Fig. 217. Notice that in all positions of the patient, the fluid occupies the lowest part of the peritoneal cavity, and the upper margin of the fluid is approximately horizontal. Of course the height of the area of dullness varies in different cases depending on the amount of fluid in the cavity. The illustrations already referred to indicate the dullness in the cases of ascites of moderate severity. If there is only a small amount of fluid in the cavity, there may be only a small area of dullness appreciable in each flank, as the patient is lying on her back. When the patient turns on the side, the area of dullness increases appreciably in the lower side and disappears entirely in the upper flank. When the patient stands, there may be a small area of dullness in lower abdomen just above the pubes, or there may be no dullness appreciable anywhere in the abdomen, because the amount of fluid is so small that it is all concealed in the depth of the pelvic portion of the peritoneal cavity. On the other hand, in exceptional cases the amount of fluid is so great that it fills the peritoneal cavity and raises the abdominal wall above the intestines (higher than the mesentery will permit the intestines to float), giving dullness about the umbilicus as well as elsewhere. This does away with the corona of resonance about the umbilicus, which is so characteristic a feature of ordinary ascites.

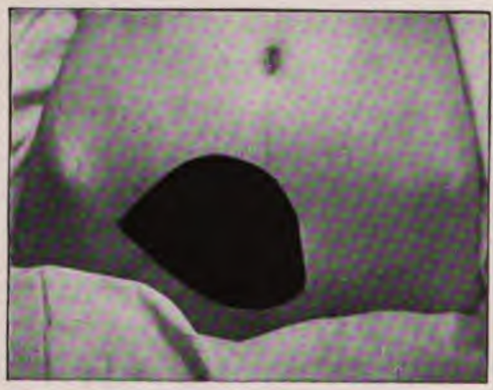


Fig. 218.—Indicating the situation of the area of dullness due to a large inflammatory mass or a small tumor arising from the right tubo-ovarian region.

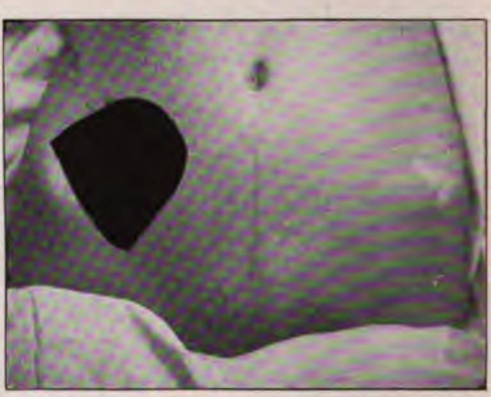


Fig. 219.—Indicating the situation of the area of dullness due to an inflammatory mass arising from the appendix or cecum.

Under differential diagnosis of ovarian cysts (Chapter XII) is given a study of a case of marked ascites with extensive dullness which was sent to the author for operation for ovarian cyst. A careful comparison of the outlines of the dullness in different positions of the patient, along with other facts, enabled the author to finally make positive diagnosis of ascites instead of cyst, which diagnosis was later confirmed. Under differential diagnosis of uterine myoma (Chapter VIII) is given a graphic study of a case presenting free fluid with shifting dullness, a uterine tumor with fixed dullness and obesity.

Encysted Fluid.—This may be serum or ordinary pus or tuberculous pus. There is dullness over the mass and resonance elsewhere (Figs. 218, 219). There is no change in the outline of the dullness on change of position of the patient, such as occurs with free fluid.

A rather rare condition of special interest coming under this category is the pseudocyst of the lesser omental cavity. An encysted collection of fluid occupying the cavity occasionally appears several weeks or months following an abdominal injury. Injuries so resulting are supposed to have involved the pancreas, it being held that the collection of fluid in the lesser omental cavity is due to the irritation from pancreatic fluid, which found its way from the damaged pancreas into the cavity mentioned. The small opening that leads from this lesser peritoneal cavity into the greater peritoneal cavity (foramen of Winslow), becomes closed in the beginning of the trouble and the fluid is confined within the lesser cavity. As this cavity lies back of the intestines, the mass of encysted fluid is partially covered by intestinal resonance, presenting the characteristic percussion signs of a retrointestinal mass.

Tumor from the Pelvic Organs.—The tumor may be solid or cystic. It may be situated in the center or laterally or may fill the whole abdomen. There is dullness over that portion of the mass lying against the abdominal wall and resonance elsewhere, unless there is associated ascites. There is no decided change of outline of the dullness with change of position of the patient. The growth may spring from the uterus (Fig. 46) or from the ovary or broad ligament. The latter growths are usually situated well to one side at first but later may fill the whole lower abdomen. Usually in such a growth there is still a corona of resonance surrounding the upper part of the growth and extending well into each flank. In other cases the tumor grows into the flank and crowds the intestines upward and into the opposite flank. In such a case there is dullness over all the front of the abdomen and also in one flank, there being resonance in the opposite flank only. There is no change of the outline of resonance with change of position of the patient, the distinct resonance in the opposite flank remaining even when the patient is turned well over on that side, provided there is no complicating ascites.

Tumor from Some Abdominal Organ.—There is dullness over that portion of the mass lying against the wall and resonance elsewhere, unless there is associated ascites. Such a tumor may spring from the liver or from the spleen or from some part of the gastrointestinal track. The usual sites for tumors in the digestive tract are the pyloric end of the stomach, the cecum and the sigmoid flexure of the colon.

Tumor of Some Retrointestinal Structure.—The characteristic feature of retroperitoneal masses (either inflammatory masses or new growths) is that there is intestinal resonance in front of them. When the growth reaches a large size the intestines are usually pushed aside over a considerable area, so that a part of the palpable tumor mass shows dullness and a part shows intestinal resonance. Fig. 220 shows such an abdominal growth. The size of the palpable tumor is indicated by the dotted outline and the area of dullness is surrounded by the solid line. Inflation of the stomach in this case caused the area of dullness to disappear almost entirely, showing that the growth sprung from some structure back of the stomach cavity. A retrointestinal tumor may spring from the pancreas or from the mesenteric glands or from the retroperitoneal glands or adjacent structures or from the kidneys or suprarenal glands. A kidney tumor not infrequently forms a large mass extending from the lumbar region towards the pelvis and the median line. The characteristic percussion sign of a kidney growth, or other retroperitoneal growth in that region, is that the colon resonance can be made out in front of it. When the growth is large, the colon may be flattened out by compression between the tumor and the abdominal wall, and in that case no colon resonance

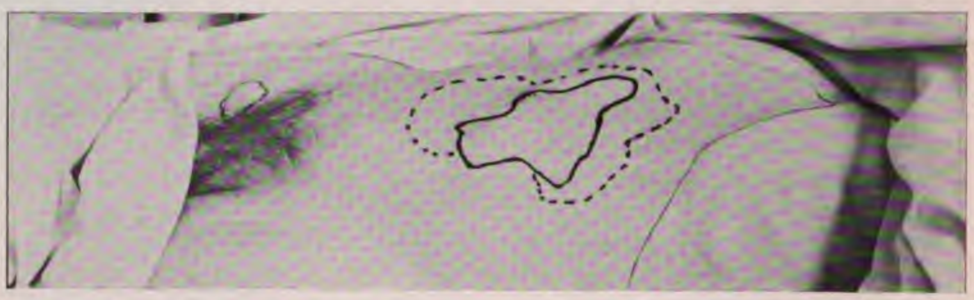


Fig. 220.—The area of dullness in a retroperitoneal growth. Same patient as shown in Fig. 204. (Dr. Elsworth Smith's patient). The area enclosed by the solid line is dull on percussion. The dotted line shows the outline of the growth as determined by palpation.

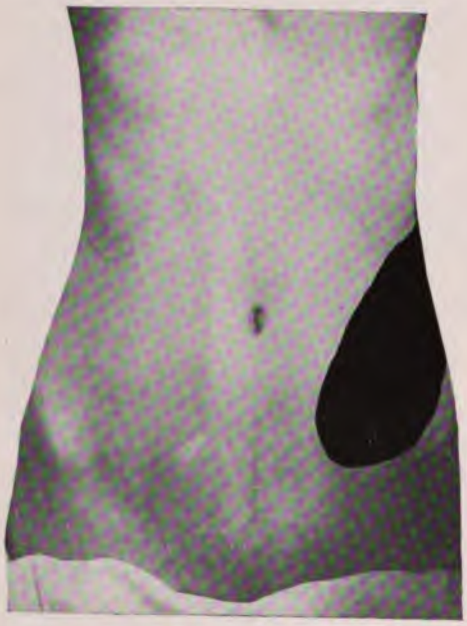


Fig. 221.—Indicating the area of dullness in the case of kidney tumor, before inflation of the colon.

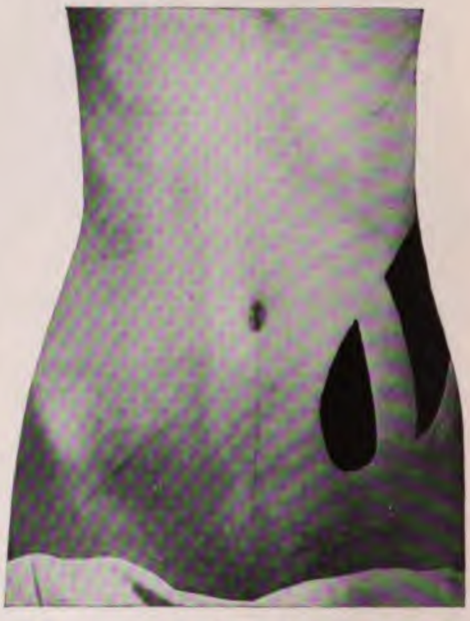


Fig. 222.—Indicating the area of dullness in the case of kidney tumor, after inflation of the colon.

would be obtained in the ordinary examination (Fig. 221). But the colon resonance can be easily brought out by inflation of the colon with air, introduced through a rectal tube by means of the ordinary double bulb or an atomizer bulb (Fig. 222). This point is well illustrated by the case of a patient referred to the author for operation for a fibroid of the uterus, which on examination with inflation of the colon, proved to be a large cystic kidney lying against the uterus.

A rare and interesting form of retroperitoneal growth is the retroperitoneal lipoma, which usually has its origin in the perirenal fat. It may grow extensively in various directions and in some cases become so large that it fills the abdomen, pushing the intestines aside or flattening them out on its surface.

Tumor or Inflammatory Mass in Abdominal Wall.—This may give rise to dullness on superficial percussion or even on moderately deep percussion. But very deep percussion will show some resonance all over, except in cases where the mass is so extremely large that the diagnosis is plain from other signs. Fig. 189 shows a growth situated in the abdominal wall.

POINTS IN EXAMINATION OF EXTERNAL GENITALS

DISCHARGE ABOUT EXTERNAL GENITALS

As explained in Chapter I, there is normally a slight discharge about the external genitals, sufficient to keep the parts moist.

Abnormal discharge may be only an increase in the normal mucoepithelial discharge or it may be mucopurulent or purulent or watery or bloody. The various kinds of discharge are conveniently considered under the two terms, leucorrhea and bloody discharge.

Leucorrhea

Under the term leucorrhea the author includes all varieties of pathologic discharge from the genitals, except discharge containing blood.

Regarding leucorrhea due to extragenital disturbances only, that is hardly probable, as the leucorrhea in itself is evidence of local disturbance. There are, however, certain cases in which the functional disturbance, evidenced by the leucorrhea, is dependent largely on malnutrition or on pelvic congestion from extragenital causes. The mild leucorrhea found in the anemic or cachetic, may disappear when the patient is put in good general health. Again, in pelvic congestion from heart disease or from some general cause, there may be present a mild leucorrhea which disappears when the functional pelvic congestion is corrected. In this sense, leucorrhea may be said, in some cases, to be due to extragenital causes and its relief to depend on treatment of the same. In all but exceptional cases, however, leucorrhea is due to one or more of the following conditions:

Inflammation or Ulcer of Vulva.—There is a history of discharge from the vulva, of burning or itching and of frequent urination with perhaps some pain. Examination of the external genitals shows redness, either general or localized to certain areas. There is tenderness and discharge and also evidence of the cause. If the trouble is an ulcer, it may be simple, chancroidal, syphilitic, tuberculous or malignant. Further examination shows no discharge from the vagina and no evidence of trouble there.

Acute Vaginitis.—There is a history of a free yellow discharge of short duration, irritation of vulva and frequent urination with some burning. Examination shows a yellow discharge and redness of vulva. If gonorrheal, there may be involvement of the vulvovaginal glands, also the discharge shows gonococci. The vaginal walls are rough and hot and tender—too tender to admit of satisfactory bimanual examination. When exposed with the speculum, the vaginal walls are reddened, and there is not enough discharge from the cervix to account for the leucorrhea.

Chronic Vaginitis occurs principally in children. There has been a yellow discharge for several weeks or months, with irritation of the vulva and some bladder irritability. Examination shows a yellow discharge and some redness of the vulva, with more or less tenderness. The discharge should be examined for gonococci. If the patient is a child, no vaginal examination is made. If an adult, examination shows tenderness and chronic thickening and roughening of vagina walls, usually most marked in the posterior fornix. Speculum examination shows redness of the vaginal walls, either generally or in patches, and there is not enough discharge from the cervix to account for the leucorrhea.

Adhesive Vaginitis occurs principally near or after the menopause. There is a history of chronic discharge, with irritation of the vulva and sometimes bladder irritability. On examination it is found in most cases that the discharge is slight and is sticky or "gluey" in character, though in exceptional cases it is free and purulent. In some cases there are scratch marks, resulting from the patient's attempts to overcome the pruritus. On vaginal examination, the vaginal walls are found adherent in spots, especially at the upper part of the vagina. If the adhesions are recent, they separate easily with some bleeding. If the adhesions are old, they are firm and in some cases the vagina is almost obliterated by the process. When the walls are separated with the speculum, in the less advanced cases, irregular spots which are raw and bleed slightly may be seen.

Ulcer of Vagina may be simple, chancroidal, syphilitic, tuberculous or malignant. There is a history of an acute or chronic discharge, and probably also of other evidences of the disease causing the ulceration. Examination shows a discharge about the vulva and more or less irritation of the surfaces. When making the vaginal examination, the indurated edges or base of the ulcer may be felt. The speculum exposes the ulcer to view, and further investigation shows it to be the sufficient cause of the discharge.

Acute Endocervicitis.—There is a history of a tenacious, stringy discharge, of recent origin. There may or may not be irritation of the external genitals. Vaginal and bimanual examination show [illegible] mination shows a stringy tenacious discharge coming from the external os. There is also congestion of the cervix and usually erosion about the external os.

Chronic Endocervicitis.—There has been a discharge for a long time. Vaginal and bimanual examination show no evidence of involvement of the corpus uteri or the adnexa. Speculum examination shows a very tenacious, stringy mucopurulent discharge from the external os, with more or less surrounding erosion. In many cases there has also been severe laceration of the cervix, the evidences of which may be felt and seen.

Laceration of Cervix.—In these cases, the discharge is due not so much to the tear itself as to the subsequent eversion and irritation and chronic inflammation. The various appearances presented by the lacerated cervix are shown in Chapters I and VI.

Ulcer of Cervix.—Such an ulcer may be simple, chancroidal, syphilitic, tuberculous or malignant. There is a history of leucorrhea. In the vaginal examination the ulcer of the cervix may or may not be felt, depending on whether or not there is any induration in the edges or base. When the cervix is exposed with the speculum, the ulcer is seen, presenting a distinctly-marked margin and a base of granulation tissue (epithelial covering entirely lost).

Malignant Disease of Cervix may appear in the form of an ulcer, with indurated margins and base, or as a papillary growth from some spot on the cervix or within the cervix. For the various appearances of beginning malignant disease of the cervix, see Chapter IX.

Polypi of Cervix.—Polypi of the cervix, of various kinds, may give rise to considerable leucorrhea, though usually a bloody discharge is the prominent feature in these cases.

Acute Endometritis, whether gonorrheal or due to other infections following labor or miscarriage, gives rise to free discharge. There is a history of recent labor or miscarriage or instrumentation or gonorrhea, or a history of chronic endometritis due to one of these causes. Examination shows a free discharge, the character of which points to the cause of the trouble, as explained in Chapter VI. Vaginal and bimanual examination show tenderness of the body of the uterus, but no tenderness around the uterus, unless there is complicating trouble. Speculum examination shows a free purulent or sanguino-purulent discharge coming from the uterus.

Chronic Endometritis. Hyperplasia of Endometrium.—There is a history of chronic leucorrhea. Examination shows nothing in the vagina or cervix to account for the discharge. The body of the uterus may be somewhat enlarged or tender, though not necessarily so. Through the speculum, it is seen that the discharge comes from the uterus and not from inflammation of the vaginal walls. The character of the discharge indicates that it comes largely from the endometrium and not from the cervical glands.

Retrodisplacement of Uterus causes leucorrhea by causing persistent congestion of the endometrium.

a of Uterus causes leucorrhea by causing chronic irritation of the
both by direct pressure and by interference with its blood

Cancer of Corpus Uteri causes leucorrhea by the breaking-down of the cancerous area, and also by the chronic irritation of the adjacent endometrium.

Periuterine Disease causes leucorrhea by causing chronic congestion of the endometrium.

Functional Congestion of the uterus or pelvis, possibly due to ovarian hyperactivity, causes leucorrhea by causing nutritive changes in the endometrium and cervical mucosa.

Bloody Discharge From Genitals

Bleeding, not connected with menstruation, may vary from a streak of blood, or a slight coloring of a mucopurulent discharge, to a free flow of blood. Occasionally there is a hemorrhage sufficiently free to threaten the patient's life. In most cases, however, the bloody discharge is slight and irregular, and is of serious import only because it may have a serious condition for its cause.

Any of the following diseases may cause a bloody discharge from the genital tract, the character of the discharge varying from a mucopurulent discharge only slightly streaked with blood, to a profuse flow of blood and clots.

All the conditions mentioned in the first part of the list give rise also to leucorrhea and are mentioned under it. The other conditions occur with pregnancy and must be thought of whenever a bloody discharge is present.

Inflammation or Ulcer of Vulva.
Acute Vaginitis.
Chronic Vaginitis.
Adhesive Vaginitis.
Ulcer of Vagina.
Acute Endocervicitis.
Chronic Endocervicitis.
Laceration of Cervix.
Ulcer of Cervix.
Cancer of Cervix.
Polypi of Cervix.
Acute Endometritis.
Chronic Endometritis.
Retrodisplacement of Uterus.
Myoma of Uterus.
Cancer of Corpus Uteri.
Periuterine Disease.
Functional Congestion.

Threatened Miscarriage.—The patient may have missed the menses only a few days or she may be several months' pregnant. Threatened miscarriage is usually accompanied by considerable pelvic pain. In exceptional cases there may be bloody discharge for several hours or a day or two, before pains begin. In some cases by questioning the patient, it will be found that, failing to come unwell at the proper time, she has been taking medicine to "bring on the flow" (produce an abortion).

Miscarriage.—Here there are sharp cramp-like pains, with the expulsion of blood clots and pieces of membrane or a formed fetus, depending on the period of pregnancy at which the accident happens. Then the pain subsides and after a few days the bloody discharge ceases.

Incomplete Miscarriage.—The uterus is not entirely emptied and the retained remnants cause a persistent bloody discharge for one or two weeks after it should have stopped, and there is also resulting subinvolution of the uterus. The blood may pass as a mucosanguinous discharge or in clots. It may disappear when the patient stays in bed, to reappear when she gets up. This is probably the most frequent cause of persistent bleeding in women of the child-bearing age. There is usually little pain after the miscarriage has taken place. The principal symptom is the bleeding, with the resulting anemia and weakness. If infection takes place, the symptoms of sepsis are added.

Placenta Previa.—Bleeding from this cause does not usually take place until the pregnancy has advanced so far that the diagnosis is perfectly clear.

Laceration of Cervix with Pregnancy.—The cervix is lacerated and everted and eroded, and there is added the softening and congestion from pregnancy. There are no pains such as accompany miscarriage. There may be some slight pain or uneasiness in pelvis, which is relieved by lying down. The bloody discharge persists, off and on, without apparent evidence of threatened miscarriage or other intrauterine disturbance.

Tubal Pregnancy.—The rupture of a tubal pregnancy, or a tubal abortion, is nearly always followed in a few days by an irregular bloody discharge, which may persist for several days or several weeks. In some cases, pieces of decidua are expelled with the bloody discharge. There are also the other evidences of tubal pregnancy (see Chapter XI).

INFLAMMATION OF EXTERNAL GENITALS

Inflammation of the vulva is due to the same causes as inflammation elsewhere, namely, irritation and infection. The most frequent form of infection here is gonorrhea, although other varieties of pus infection may be engrafted on wounds or abrasions.

Gonorrheal Vulvitis.—There is a free yellow discharge, with usually more or less involvement of the urethra and also of the ducts of the vulvovaginal glands (Figs. 56, 60). There is no cause apparent for the persistence of a simple inflammation. Microscopic examination of the discharge shows gonococci.

Simple Vulvitis occurs most frequently in children and is due to uncleanliness of the parts or to an irritating vaginal discharge or to irritating urine or to scratching or other irritation. This is not usually so severe as gonorrheal inflammation and subsides when the parts are cleansed frequently and protected from irritation. A considerable proportion of the cases of chronic vulvitis in children are gonorrheal. Consequently the discharge should be examined to determine that point.

Follicular Vulvitis is characterized by the inflammation being localized principally in the follicles here and there.

Pruritus Vulvae.—Itching of the genitals, from various causes, leads to scratching and consequent inflammation. Usually some cause can be found for the itching. If not, the affection is for the time being, given the above name.

Kraurosis Vulvae is a peculiar neuroatrophic condition of the external genitals, usually preceded by a long period of pruritus. The skin becomes atrophic and has a bleached, a drawn and withered appearance. It is seen most frequently in elderly women, and is usually accompanied by intense pruritus, as attested by the history of the case and by the abrasions from scratching.

ULCER ON EXTERNAL GENITALS

Simple Ulcer presents none of the characteristics of special ulcers. There is some source of irritation sufficient to account for the ulcer and it heals quickly under simple cleansing treatment.

Chancroidal Ulcer (soft chancre).—This is an angry-looking sore with sharp-cut or undermined edges. It is painful. The margins are soft unless very old, and in any case do not present the extensive and firm induration found in the fully developed syphilitic chancre. Usually there are one or more small sores on the surfaces that come in contact with the secretion from the first sore. There may be a history of suspicious coitus a few days previous to the development of the sore. The ulcer persists in spite of simple antiseptic remedies. After cauterization with carbolic acid, it presents healthy granulation and heals rapidly.

Syphilitic Ulcer.—A syphilitic sore appearing about the external genitals may belong to the primary, secondary or tertiary stage of the disease.

(a) PRIMARY SYPHILITIC ULCER (HARD CHANCRE) appears ten days or two weeks after intercourse, but may be preceded by a simple sore or chancroidal sore (mixed infection). It is not painful unless irritated or inflamed. It gradually enlarges and develops a distinct induration. It is, a little later, accompanied by enlargement of the inguinal glands. The enlarged glands are painless, discrete and nonsuppurating. There is only one such sore. It is followed in one or two months by the secondary manifestations.

(b) SECONDARY SYPHILITIC ULCERS are usually multiple and very superficial, amounting to little more than abrasions. They show a moist, raw-looking surface, or are slightly raised whitish areas ("mucous patches"). They are accompanied by one or more of the various other secondary manifestations of syphilis, the most common of which are persistent sore throat, mucous patches in the mouth, enlargement of postcervical and epitrochlear glands, roseola on chest and abdomen, and loss of hair.

(c) TERTIARY SYPHILITIC ULCER usually has deep undermined edges. It is destructive and not especially painful, and is accompanied by other evidences of syphilis, such as ulcer of rectum, gummata along tibia, night pains, etc. It yields to antisyphilitic treatment, provided the general health is not too much depressed.

Tuberculous Ulcer is a chronic ulcer with indurated margins and presenting small yellow granules in the base. It is not particularly painful, but is persistent in spite of cleansing treatment. Microscopic examination of an excised piece, shows tuberculosis.

Malignant Ulcer is a chronic ulcer with a considerable area of induration around it. It bleeds easily, and the bleeding is not checked by the application of 10 per cent copper sulphate solution. The ulcer persists in spite of treatment. Microscopic examination of an excised piece shows carcinoma or sarcoma.

Ulcus Rodens Vulvae is chronic and is irregular in shape, extending in various directions and healing in others, and resists treatment. It presents none of the pathognomonic signs of chancroidal, syphilitic, tuberculous or malignant ulcer. The essential feature of ulcus rodens vulvae is a chronic destructive ulcer of the vulva that cannot properly be assigned to any of the other classes.

MALFORMATIONS OF EXTERNAL GENITALS

The more common deviations from the normal, found in uninjured genitalia, are as follows:

Preputial Adhesions (see Chapter IV).—The prominent end of the clitoris seems to be absent. Investigating further, to see just what is the trouble, it is found that the folds of the labia minora, which encircle the clitoris, are agglutinated so that the glans clitoridis is partially or entirely hidden.

Labial Adhesions.—The labia minora may be adherent partially or completely.

Imperforate Hymen.—There is no opening into the vagina and there has been no menstrual flow. There may or may not be some bulging of the imperforate hymen. If there is much blood collected back of the obstruction, fluctuation may be obtained. Fig. 905 shows the appearance of the vestibule in such a case. Fig. 906 gives a diagrammatic representation of the conditions internally. The condition is fully described and illustrated in Chapter XIII.

Absence of Vagina.—The condition of the external genitals in a patient with no vagina are shown in Chapter XIII.

Double Vagina (Chapter XIII).—The opening of the second vaginal canal may be very apparent or it may be hardly noticeable on cursory inspection. In one of the author's cases there was simply an unevenness, that attracted his attention almost by accident. Investigating the slight irregularity at the side of the vaginal entrance he found a slit-like opening leading into a second vaginal canal which was collapsed.

LACERATIONS ABOUT VULVA AND PERINEUM

There are of course slight lacerations of the hymen in normal coitus, but the resulting condition belongs under the normal appearance of the genitals. The same may be said of the usual widening and relaxation of the vaginal opening resulting from labor.

Laceration from Labor.—Laceration of the perineum and vagina in labor produces changes varying all the way from a moderate enlargement of the vaginal orifice to complete destruction of the perineum, with exposure of the rectal mucosa and incontinence of feces. These conditions are described and illustrated in Chapter V. Occasionally there are lacerations of the external genitals from other causes, such as rape or falls.

SWELLING ABOUT EXTERNAL GENITALS

Colpocele, Cystocele, Rectocele (Chapter V).—These swellings appear as the result of lacerations. The fact that the bladder wall is prolapsed along with the vaginal wall is indicated by the fact that the patient has more or less difficulty in urinating, and in some cases she must push back the mass before she can urinate satisfactorily. When there is doubt as to whether the bladder wall comes down, the lowest part of the bladder cavity may be located with a steel bougie.

Inflammation of Vulva (erysipelas, cellulitis).—There are the usual signs and symptoms of acute inflammation. Owing to the large amount of loose cellular tissue, the inflammatory infiltration may cause very marked swelling.

Hematoma of Vulva.—There is rapid swelling following a puncture with a hypodermic needle or a fall or other injury. There is marked enlargement, painful on pressure and presenting in a short time discoloration from blood pigment. There is no fever or erysipelatous redness or other evidence of acute inflammation.

Edema of Vulva (from heart or liver disease or from pressure by a pelvic tumor).—This produces a boggy, painless swelling which pits on pressure. There is no evidence of acute inflammation or of hematoma. There may be accompanying edema of the abdominal wall and lower extremities. There is found some internal trouble to account for the edema (heart disease with failing circulation, tumor or inflammatory mass obstructing the pelvic circulation).

Stasis Hypertrophy of Vulva.—There is a gradual development of tissue hypertrophy, with more or less inflammatory infiltration. The swelling is not particularly painful and there is no decided pitting on pressure. It is accompanied by scar-tissue, resulting from chronic ulceration, of such extent and so situated at the vaginal entrance as to obstruct the lymph and blood circulation (see Chapter IV).

Another cause of stasis hypertrophy is the infiltration and hypertrophy due to the lymph vessels being choked with a parasite, the filaria sanguinis hominis. This is seen almost exclusively in tropical countries.

Elephantiasis of Vulva.—The term "elephantiasis" is very appropriately applied to the cases of enormous labial hypertrophy. The stasis hypertrophy previously described is often spoken of as "elephantiasis," but it does not seem advisable to use the term so loosely (see Chapter IV).

Varicose Veins of Vulva not infrequently cause marked swelling. Serious enlargement of the veins is found most frequently in pregnancy or in the case of some pelvic tumor or inflammatory mass obstructing the pelvic circulation. Alarming hemorrhage has followed the rupture of an enlarged vein in such cases.

Condylomata of Vulva.—FROM CHRONIC IRRITATION.—As a result of persistent irritation and discharge about the vulva, small papillary masses grow from the skin at various points (see Chapter IV). They may come from any persistent irritation, though chronic gonorrhea is the most frequent cause. Sometimes they appear in great profusion and occasionally they coalesce and form large papillary masses. These papillary growths are called pointed condylomata, in contradistinction to the flat condylomata which are usually due to syphilis.

From Syphilis.—In secondary syphilis, white areas with infiltration sufficient to raise them above the surface, often appear about the external genitals (see Chapter IV). There may be few or many, and they may be raised much or little. They are usually flat condylomata, only rarely being pointed or papillary.

Vulvovaginal Gland Cyst or Abscess.—The swelling has much the same appearance whether it be a cyst or an abscess (see Chapter IV).

Hypertrophy of Labia.—The hypertrophies affect principally the labia minora, either the free portion on one or both sides or that portion extending up over the clitoris as the prepuce. The hypertrophied portions contain much redundant tissue and are corrugated and usually somewhat pigmented. In some cases the hypertrophy becomes very marked, as in the Hottentot "apron" (see Chapter IV).

Hypertrophy of Clitoris is much rarer than hypertrophy of labia. Occasionally the clitoris is considerably enlarged.

Malignant Disease of Labia or Clitoris.—Malignant disease (carcinoma or sarcoma) appears upon the labia as a small reddened nodule, which later ulcerates. For appearance in different stages, see Chapter IV.

Nonmalignant Tumor of Labia or Clitoris.—Fibromata and lipomata and cysts occur on the labia or clitoris, though not very frequently.

Pudendal Hernia.—A hernia of intestine or omentum or other intraperitoneal structure may take place through the inguinal canal and appear in the labium majus of that side (see Chapter IV).

Another form of pudendal hernia is that which comes by way of the vagina, the protrusion taking place in front of the uterus in some cases and behind the uterus in others.

Pudendal Hydrocele.—A collection of fluid occasionally occurs in the canal of Nuck, forming a hydrocele, which corresponds to hydrocele of the cord in the male.

Tumor of Round Ligament.—Fibromyoma of the round ligament is a rare condition and one that causes much distortion of the structures about the inguinal canal, consequently it is likely to lead to an erroneous diagnosis. It should be considered whenever there is a peculiar swelling in the neighborhood of the inguinal canal.

Prolapse of the Urethral Mucosa occurs to a slight extent in many women who have borne children or have had inflammation of the urethra. Not infrequently the protrusion is marked and no doubt leads in many cases to an erroneous diagnosis of caruncle. The prolapsed mucosa encircles a considerable part of the circumference of the meatus, and a close inspection will show that the small mass presents the smooth, though irregular, surface of hypertrophied mucosa, instead of the papillary projections usually present in urethral caruncle. Again, the meatus is much widened from the previous injury or inflammation, and the prolapsing of the mucosa may bring into view the orifice of the duct, or Skene's gland, on one or both sides.

Urethral Caruncle is a distinct new growth, usually papillary in form, springing from the region of the meatus. It may have a narrow pedicle or a broad attachment, but does not tend to encircle the meatus as does prolapsed mucosa.

Malignant Disease of Urethra.—This starts usually in some small spot of irritation about the meatus, and in the early stage presents a small ulcer or induration. Later the infiltration involves the vestibule, urethra and adjacent tissues.

Suburethral Abscess.—This consists of a pouch formed by a diverticulum from the urethra, usually from the inferior wall. Inflammation and suppuration take place in this pouch, which may or may not drain irregularly into the urethra. When distended, it may project at the vaginal orifice like a small cyst of the anterior vaginal wall.

Prolapse of Uterus.—When the uterus prolapses sufficiently, the firm cervix, with the external os near the center, appears at the vestibule, or it may come still farther, even, so that the entire uterus is outside the body (see Chapter VII).

The bladder may or may not prolapse along with the uterus.

Elongation of the Cervix produces a condition which is not infrequently mistaken for prolapse. If the hypertrophy affects only the infravaginal portion of the cervix the vaginal walls are not carried down but remain in normal position. When the elongation affects the supravaginal portion, both vaginal walls are carried down with the protruding cervix, producing a condition very likely to be mistaken for uterine prolapse, unless the depth of the uterine cavity be measured or the body of the uterus be carefully outlined by bimanual palpation. In these cases the dragging of the relaxed and redundant vaginal walls seems to be an important factor in producing the elongation of the cervix. When the hypertrophy or stretching, as the case may be, affects the intermediate portion of the cervix, the anterior vaginal wall is usually carried down while the posterior wall remains in place. The time-honored division of the cervix into three portions is convenient for fixing in mind the conditions ordinarily present in these cases, but it must be remembered that in many cases the vaginal wall does not run very much further up on the posterior part of the cervix than it does on the anterior and, consequently, elongation of the middle or intermediate portion of the cervix does not always carry down the anterior vaginal wall and leave the posterior in place.

The differentiation from prolapse of the uterus is made by locating the fundus uteri at about the normal position in the pelvis, by vaginoabdominal or rectoabdominal palpation, and, if necessary, by sounding the uterus to determine the length of the uterine cavity. In elongation, the cavity is increased in length sufficiently to account for the appearance of the cervix at the vulva. In prolapse of the uterus, there is usually some elongation of the supravaginal portion of the cervix by the dragging of the prolapsing vaginal walls, but it is of secondary importance. In the cases in which the elongation of the cervix is the principal lesion, there is usually some prolapse of the uterus, due to the dragging of the heavy cervix.

Tumor of Uterus.—A mass appearing at the vulva may be a pediculated myoma or a malignant tumor from the uterus.

Inversion of Uterus.—This rare condition may produce an appearance very closely resembling a necrotic, bleeding tumor protruding from the vulva. The internal conditions are shown in Chapter VII.

Vaginal Cyst.—This may be confounded with cystocele or vaginal hernia or suburethral abscess. The differential diagnostic points are the absence of inflammation, the distinct fluctuation, the tenseness of the sac containing the fluid and its attachment to some part of the vagina.

POINTS IN THE VAGINAL EXAMINATION

ROUGHENING OF VAGINAL WALLS

Astringent Douche.—Any astringent douche, for example, one containing alum or bichlorid, will cause temporary roughening of the vaginal wall. But there is no particular tenderness.

Inflammation.—It is found in acute vaginitis, simple or gonorrheal, and in some cases of chronic vaginitis. In addition to the rough granular feel, there is tenderness of the wall, and the speculum examination shows reddening.

TENDERNESS ON VAGINAL PALPATION

Inflammation of Vaginal Entrance.—The tenderness is noticed as soon as the examining finger begins to enter the vagina. There may be diffuse redness of the surface around the vaginal orifice or there may be simply reddened areas that are tender on pressure or there may be abrasions or slight fissures or there may be one or more distinct ulcers.

Inflammation of Vulvovaginal Gland or Duct.—There is swelling and tenderness at the site of the gland and redness about the duct, and in some cases pus may be squeezed from the duct.

Hyperesthesia of Vaginal Entrance.—There is great exaggeration of the reflex sensibility of the tissues immediately about the vaginal orifice, and yet no evidence of inflammation or fissure or ulcer or other adequate cause for pain. In some cases the reflex excitability is so great that contact causes spasm of the levator ani and associated muscles to such an extent as to prevent the examination. This uncontrollable spasmodic closure of the vaginal orifice is known as "vaginismus."

Inflammation of Vagina.—There is purulent discharge and the vaginal walls are rough and hot. Speculum examination shows marked reddening of the walls (arterial congestion) and also discharge upon them.

Inflammation of Urethra.—The tenderness is along the lower part of the anterior vaginal wall and is complained of when pressure is made along the course of the urethra. There may be distinct thickening about the urethra, which may be felt as a firm cord beneath the pubic arch. In most cases there is redness about the meatus, and some discharge may be pressed out by compressing the urethra from above downward (Figs. 56, 57).

Inflammation or Other Painful Affection of the Bladder.—Pain is caused by pressure upward along the middle of the anterior vaginal wall, which lies against the base of the bladder. There are also the symptoms of bladder irritation (frequent urination, painful urination), and also the findings on urinary analysis.

Inflammation or Other Painful Affection of the Rectum.—Pain is caused by pressure backward along the posterior vaginal wall. There is also evidence of rectal irritability (pain on defecation, rectal tenesmus), and possibly the passage of blood or mucus.

Inflammation Around Uterus (cellulitis, salpingitis, pelvic peritonitis).—Pain is caused by pressure on the vaginal wall around the uterus, either in front of the cervix or behind it or at one side. Pain is caused also by any attempt to move the uterus, as by pushing on the cervix.

MASS FELT IN VAGINAL PALPATION

Prolapsed Vaginal Wall (Colpocele).—The vaginal wall is more redundant than it ought to be and part of it descends toward the opening. It may be the anterior vaginal wall (anterior colpocele) or the posterior vaginal wall (posterior colpocele) or both. The mass presents the characteristics of relaxed vaginal wall. There is no distinct firm body in it.

Prolapse of Bladder (Cystocele).—In some cases of prolapse of the anterior vaginal wall, the bladder follows the vaginal wall. This is known as cystocele, as previously explained. The bladder wall is soft and, therefore, cannot be felt distinctly in the mass, as the uterus can. It is noticed, however, that there is much more soft tissue in the mass than would be furnished by the prolapsed vaginal wall and, as the bladder lies next to the vagina, it is to be assumed that this extra tissue is bladder wall. Sometimes there is enough urine in the prolapsed pouch of bladder to give fluctuation. Usually there is some bladder irritability (frequent, painful urination), and in some cases the patient has found that she must push back the mass each time before she can urinate satisfactorily. If there is still doubt as to whether or not the bladder descends with the vaginal wall, and it is important to know certainly, introduce a steel urethral bougie (about No. 20F) and see whether the tip passes easily into the mass.

Prolapse of Anterior Wall of Rectum (Rectocele).—The anterior wall of the rectum may follow the posterior vaginal wall in its descent through the vaginal orifice. A digital examination per rectum will quickly show whether or not the cavity of the rectum extends into the mass.

Prolapse of Uterus.—The cervix is felt much lower (closer to the vaginal entrance) than normal, or it may present at the vaginal orifice or even project far outside. Bimanual examination shows that the body of the uterus also is lower than usual, and consequently that the condition is prolapse of the uterus and not simply elongation of the cervix.

Elongation of Cervix.—The cervix is felt much lower than it ought to be. Bimanual examination shows that the body of the uterus is in normal position. If the bimanual examination does not make plain the length and position of the body of the uterus, the uterus may be sounded. This will show th
length of the uterus is sufficient to account for the low positio

In some cases the two conditions, prolapse of the uterus and elongation of the cervix, are both present.

Tumor of Uterus.—There is a solid or semisolid mass lying in the vagina. The finger may be passed all around, between the mass and the vaginal wall. When the finger is passed around the mass, its connection with the cervix is felt. It may spring from a portion of the cervix within reach, or it may be connected with a pedicle extending up into the canal.

Inversion of Uterus.—There is a mass the size of the uterus lying in the vagina, having a raw looking mucous surface exposed. Palpation of the upper part of the mass shows that it is connected with the cervix by a broad pedicle, and the dilated cervical ring may be felt around it. Illustrations in Chapter VII and Chapter VIII give a clear idea of inversion and conditions that may be confounded with it (Figs. 590, 652 to 662).

Bimanual examination (under anesthesia, if necessary) shows the body of the uterus absent from where it should be, and instead there is a cup-like depression above the cervical ring (Fig. 591). Also, a sound will not pass up into the uterine cavity but is stopped on all sides a short distance within the cervical opening. There may be inversion associated with a tumor.

Tumor of Vaginal Wall is usually a cyst. A rounded mass containing fluid is felt and, tracing it up, it is found to be attached to the vaginal wall. It cannot be reduced into the peritoneal cavity like a hernia, neither is there any evidence of any obstructive bowel disturbance. Solid tumors of the vaginal wall sometimes occur.

Vaginal Hernia is felt as a soft elastic mass, causing projection of the vaginal wall. It can be reduced into the peritoneal cavity but returns when the patient coughs or bears down. It disappears when the patient is in the knee-chest posture, unless strangulated or incarcerated. There may or may not be symptoms of intestinal obstruction, partial or complete.

Abscess Pushing Vaginal Wall Inward.—Such an abscess may arise in the connective tissue beside the cervix or in the posterior culdesac or in front of the cervix or as an ischio-rectal abscess. It may arise also in the rectovaginal septum.

Rectum Distended With Fecal Masses.—If the fecal masses are in the lower part of the rectum their character is apparent, but if in the upper part of the rectum, back of the uterus, they may be confused with other masses. The characteristics of such a fecal mass are that it is situated in the course of the rectum, that it is not particularly tender, that it has a putty-like consistency and may be indented by the examining finger and the dent remains, that it may be moved along to a different part of the rectum and that an enema removes it.

Tumor of Rectum.—There is a mass felt through the posterior vaginal wall. There are the evidences of rectal irritation and also the facts that may be made out on rectal examination.

Tumor of Bladder.—A mass is felt through the anterior vaginal wall. There are the evidences of bladder irritation (frequent, painful urination) and

Mass in Culdesac of Douglas is felt back of the cervix and may be a retroflexed uterus, a tumor, a prolapsed ovary or tube, an inflammatory exudate, an abscess, or a hematocele.

CHANGES IN CERVIX UTERI FELT ON VAGINAL EXAMINATION

Displacement of Cervix.—Forward Displacement (pointing forward) may be due to backward displacement of the uterus, to anteflexion of the cervix or to an inflammatory mass or a tumor back of the cervix pushing it forward. Backward Displacement may be due to a distended bladder or a tumor of the bladder, to an inflammatory mass or a tumor in the front part of the cervix pushing it backward or to old adhesions back of the cervix pulling it backward. Lateral Displacement of the cervix may be due to an inflammatory mass, a blood mass or a tumor at the side of the cervix pushing it toward the opposite side, or to old adhesions or to scar tissue in the vaginal wall on one side pulling the cervix to the same side.

Enlargement and Distortion of the Cervix may be caused by inflammation with eversion of mucosa, or by laceration with eversion of mucosa, or by chronic inflammatory infiltration and obstruction of gland ducts from scar-tissue, causing cystic degeneration, or by a fibroid tumor of the cervix or by a malignant tumor of the cervix. Idiopathic elongation of the cervix, also, may cause it, but that is a very rare condition.

Softening of the Cervix may be due to normal pregnancy or to extra-uterine pregnancy or to a recent pregnancy (terminated by labor or miscarriage). In Fig. 85, the softened portion is represented by the dotted area. This feels soft, like the vaginal wall or like velvet, as there explained. It has been aptly said that "the cervix normally has about the consistency of the tip of the nose. When it is soft as the lip, look out for pregnancy." This softening begins at the lower part of the cervix in the first few weeks of pregnancy and gradually progresses upward until, in the last month, the whole cervix is so softened that it is sometimes hardly felt in the examination. Occasionally marked chronic congestion, from the presence of a tumor or inflammatory mass, will be accompanied by some softening of the cervix.

Hard Nodule in the Cervix may be due to scar-tissue from laceration, to a myoma, to beginning malignant disease or to a glandular cyst. In scar-tissue, the induration corresponds with the scar and follows the course of the scar, and it does not increase in size under observation. In cystic disease (Chapter VI) if the nodule be punctured and pressed upon, the characteristic clear glairy substance will be extruded and the induration will largely disappear. In myoma of the cervix myomatous nodules elsewhere in the uterus may be found, making it probable that the cervical nodule is similar in nature. A nodule in the cervix that does not correspond with any of the conditions just mentioned, may be beginning malignant disease. A piece of it should be excised and submitted to microscopic examination, to establish certainly the diagnosis at a time when a diagnosis will do some good.

Tenderness of the Cervix usually means inflammation around the uterus. The tissue of the cervix is ordinarily not painful to pressure even when diseased. The tenderness so often complained of when pressure is made on the cervix, is usually due to some inflammation around the uterus and consequent pulling on inflamed periuterine tissues due to the moving of the uterus.

Fixation of the Cervix may be due to inflammatory exudate, to a tumor about the uterus or to scar-tissue in the upper part of the vagina.

Abnormal Mobility of the Cervix is due to stretching of the supporting tissues around it and of the pelvic floor below it.

MASS FELT IN CERVICAL CANAL

On palpating the cervix some one of the following small masses may in some cases be felt just within the external os or projecting slightly from it.

Blood Clot is soft and easily broken, if it projects far enough to permit of its being caught between the fingers. When it is up in the canal so that only the lower edge or end can be felt, it may feel very much like a piece of tissue. Introduce the uterine dressing forceps beside the finger and catch the small mass and bring it outside for inspection.

Placental Remnants.—In incomplete miscarriage a small piece of tissue may often be felt in the cervical canal, showing that there are retained remnants that must be removed. It is in this same class of cases that a firm blood clot in the cervix may lead to an erroneous diagnosis, hence the importance of removing the small mass with a forceps so that it may be examined to determine certainly whether it is a piece of tissue or only a blood clot. To determine whether it has the bushy projections of placental tissue, spread it out in water. If it is of doubtful character, submit it to microscopic examination. It may be a broken off papillary mass from a malignant growth in the uterus.

Mucous Polypus.—Mucous polypi are frequently found projecting from the cervix or up in the canal (Figs. 490, 492). They may be so soft as to be hardly noticed in the digital examination but, when projecting from the canal, are very apparent in the speculum examination.

Fibrinous Polypus is a polypus which has gradually enlarged from accretions of fibrin about a placental remnant or other small mass in the uterine cavity. Its character is determined by microscopic examination.

Myomatous Polypus is a small pediculated submucous fibroid, the pedicle of which has become stretched sufficiently to permit the mass to appear at the external os or to project from the same. It may be attached in the body of the uterus or in the cervix, usually the former.

Malignant Polypus.—A malignant growth in the cervix or in the body of the uterus may send out a papillary projection that appears at the external os as a polypus. Again malignant change may be present in, or may develop in, apparently simple polypi. For this reason all polypi of whatever kind removed from the cervix should be preserved that their exact character may be determined by microscopic examination (Fig. 720).

POINTS IN THE VAGINOABDOMINAL EXAMINATION

CHANGES IN CORPUS UTERI

Backward Displacement of the Uterus.—The body of the uterus is not made out in front (Fig. 97). In the back part of the pelvis there is felt a body, apparently continuous with the cervix, and of the size, shape and consistency of the corpus uteri (Figs. 98, 99). It may be movable or fixed, tender or not tender. No other mass is felt in the pelvis. Such a mass is in all probability the body of the uterus in backward displacement. If some of the necessary points cannot be made out distinctly and there are circumstances which make it important to know at once the exact location of the corpus uteri, this may be determined certainly by introducing the sound into the uterus. But do not use the sound except when there is some special reason for doing so, and remember the contraindications to sounding given in Chapter I.

This retrodisplacement of the body of the uterus may be due to a full bladder or to an inflammatory mass in the front part of the pelvis or to a tumor. On the other hand, the displacement itself, with or without an accompanying inflammatory trouble, may be the principal lesion.

Forward Displacement of the Uterus.—Forward displacement of the body of the uterus may be due to the body of the uterus being heavy and softened, as in early pregnancy and also in certain inflammatory conditions, or to an inflammatory mass or a tumor pushing the fundus forward and downward.

Lateral Displacement of the Uterus may be caused by an inflammatory mass or by a blood mass or by a tumor, pushing the uterus toward the opposite side. It may be due also to old adhesions drawing the uterus to the side, or it may be due simply to a heavy uterus leaning to the side.

Slight Enlargement of the Uterus may be caused by early pregnancy. There is usually decided anteflexion of the softened uterus in this early stage (Fig. 105). Occasionally there is backward displacement of the pregnant uterus. From about the sixth to the twelfth week there is a peculiar softening and compressibility of the lower portion of the body of the uterus which contrasts markedly with the less compressible portion above. This is known as Hegar's sign, and when well marked is a strong indication of early pregnancy. Fig. 105 shows the section of a uterus in early pregnancy. Figs. 105 to 108 explain the sensation imparted to the examining finger. The examination may be made in the usual way, with the abdominal fingers back of the uterus (Fig. 107), or the abdominal fingers may be pressed in front of the fundus uteri, which is displaced somewhat backward, while the vaginal fingers are placed behind the uterus (Fig. 108).

Slight enlargement of the uterus may be due also to tubal pregnancy or to chronic inflammation or to one or more myomatous nodules (Figs. 103, 104), or to carcinoma of the corpus uteri or to sarcoma or to lipoma or to pyometra or to tuberculosis of the uterus (Fig. 523).

Marked Enlargement of the Uterus may be due to normal pregnancy. Bear in mind that the pregnant uterus is not always regular in shape, but is occasionally quite irregular. Enlargement may be due also to a pregnancy somewhat abnormal, for example, presenting backward displacement or hydramnios or hydatidiform mole or hematom-mole. Again, marked enlargement of the uterus may be caused by interstitial pregnancy or by pregnancy in a septate uterus.

Aside from pregnancy, the usual causes of marked enlargement of the corpus uteri are myomata and malignant disease.

In some cases there is an association of fibroid and pregnancy or of malignant disease and pregnancy.

In rare instances the uterus has become enlarged from menstrual blood retained because of atresia of the cervix (hematometra) or from a collection of pus (pyometra) or of pus and gas (pyopsysometra).

Softening of the Corpus Uteri is caused by the various forms of intrauterine pregnancy. In most cases of early pregnancy the characteristic compressibility of a portion of the uterus (Hegar's sign) may be made out, and when well marked is of much assistance in differential diagnosis. Softening of the corpus uteri may be caused also by extrauterine pregnancy and likewise by a recent pregnancy (i.e., for a few weeks following labor or miscarriage). It is caused also by edema of the uterine wall, from adjacent inflammation or from a tumor interfering with the circulation or from marked displacement.

Hard Nodules Felt in the Corpus Uteri may be due to parts of the child in pregnancy or to myomata or to a malignant tumor. In rare cases an atheromatous or sclerotic process may cause hardening of areas appreciable to the finger. Also, a mass of exudate or some adherent structure may cause a hard mass that appears, on bimanual examination, to be a part of the uterus.

Marked Tenderness of the Uterus may be caused by inflammation of the uterus, by inflammation around the uterus, by hemorrhage around the uterus, by pelvic neuralgia or by functional hyperesthesia (hysteria, neurasthenia).

Fixation of the Uterus may be due to an inflammatory mass, to a hemorrhagic mass, to old adhesions, to a new growth or to scar-tissue from vaginal laceration.

Abnormal Mobility of the Uterus is due to overstretching of the supports around it and of the pelvic floor below it.

MASS OR INDURATION

In Pelvis or Lower Abdomen, Felt on Bimanual Examination

MASS LOW IN PELVIS, AND TO RIGHT OF CERVIX

A. Mass or Induration Firm (No Fluid Felt)

1. **Body of the Uterus Displaced to the Right.**—The mass is directly continuous with the cervix and is about the size and shape of the body of the uterus. The uterus cannot be felt elsewhere. If not adherent or very tender, it may be pushed back to the normal position of the corpus uteri. The uterus

may lie somewhat to one side, though freely movable, or it may be drawn to one side by adhesions, or it may be pushed over by a tumor or an inflammatory mass or a blood mass.

The displaced uterus may be of a normal size or it may be enlarged. If enlarged, it may be of regular shape or distorted. It may be of normal consistency or softened or presenting hard nodules. If there is inflammation in the uterus or around it, it may present decided tenderness. Whether it is movable or fixed depends on the cause of the displacement. If there is attachment by adhesions to the pelvic wall or to an inflammatory mass or to a tumor, determine whether it is at the lower or upper part of the uterus.

2. **Salpingitis with Exudate,** extending to the side of the culdesac. The inflamed tube itself is situated higher, but some fibrinous peritoneal exudate has extended down so that it is felt to the right side of the cervix posteriorly.

3. **Salpingitis with Prolapse of Thickened Tube.**—The enlarged and indurated tube may be movable, or it may be bound in its abnormal situation by adhesions.

4. **Salpingitis with Secondary Infiltration** of the connective tissue about the cervix. This presents practically the same signs low in the pelvis as a primary cellulitis, but in addition there is felt higher, the mass formed by thickened tube and peritoneal exudate.

5. **Oophoritis with Prolapse of Ovary.**—The ovary is usually enlarged and cystic, but none of the cysts are yet large enough to give distinct fluctuation. Ordinarily, the ovary feels much softer on palpation than either an infiltrated tube or a mass of exudate. This softness may be so marked as to lead to the erroneous idea that fluctuation (a well marked cyst) is present, while in fact the ovarian tissue may be practically normal. The chronically inflamed ovary is occasionally as firm as other tissue which is the seat of inflammatory infiltration. This is the case particularly in the cirrhotic ovary, which is also usually smaller than the normal ovary.

The fact that the mass, felt to the right of the cervix posteriorly, is the ovary, is determined by noticing its position, size, shape, consistency, tenderness, mobility and point of attachment. The ovary is usually decidedly tender, even when normal, and pressure upon it produces a peculiar sickening pain.

One of the characteristics of the prolapsed ovary, when not adherent, is that it is freely movable. It slips away from the examining finger and may be pushed up out of the lower part of the pelvis. Following the mass up and making deep bimanual palpation, its point of attachment is found to be in the tuboovarian region. If there has been any peritoneal exudate, the ovary is likely to be fixed in its abnormal position by adhesions.

6. **Small Abscess** from any of the above conditions, near the posterior lateral part of the cervix and with such a thickened wall that no fluctuation is obtained. There is a point of marked tenderness, with fixation of the tissues in the vicinity. If of recent origin there will be some fever, but in an old abscess the temperature may be practically normal. The history of the trouble and the findings elsewhere in the pelvis will indicate the character of the primary lesion.

7. **Adhesions** at the side of the cervix from any of the above affections,

In the absence of pus or active inflammation, there is usually not much tenderness. The principal signs are induration, without a definitely-outlined mass, and fixation.

8. **Cellulitis** may be acute or subacute. The induration is situated very low and blends with the cervix. It may be a small mass or may fill all that side of the pelvis, extending out to the pelvic wall. As a rule its shape corresponds approximately with the connective areas. If the inflammation is in the parametrium (above the levator ani), it is immediately about the cervix. If it is below the levator ani, in the ischio-rectal space, the induration will be lower, along the vaginal wall and rectum, and there will be induration near the anus. In pelvic cellulitis, except in the acute cases, the induration feels exceptionally hard, possibly because there is but little intervening soft tissue between the examining finger and the infiltration. The hardness is so marked in some cases as to give the impression of a cartilaginous growth from the pelvic wall. The uterine attachment of the mass is low, principally about the cervix. The outer extremity extends to the pelvic wall, where it is intimately attached over a broad surface.

9. **Small Abscess from Cellulitis,** with wall so thick that no fluctuation is obtained. There is a point of marked tenderness, with some fever, and a mass of induration presenting the characteristics of cellulitis.

10. **Scar-Tissue from Former Cellulitis.**—As explained elsewhere, uncomplicated cellulitis, like other forms of lymphangitis, runs its course and ends in resolution or abscess formation with discharge of the pus. In either case the accompanying inflammatory infiltration eventuates in the formation of new connective tissue which contracts like other scar-tissue, causing persistent induration and fixation of tissues in the affected area. There is not much tenderness from the scar-tissue itself, but the resulting compression or constriction of nerves and interference with the circulation by distortion, may exceptionally cause persistent tenderness and pain.

11. **Scar-Tissue from Laceration in Labor.**—Not infrequently tears of the cervix are so extensive that they involve the vaginal wall and the parametrium, giving scars that may be felt beside the cervix. The induration may be linear or widespread. The fixation of the cervix may be slight or marked, depending on the amount and situation of the scar-tissue. Usually there is not much tenderness.

12. **Malignant Infiltration** of the parametrium, extending from the cervix uteri or the bladder or the rectum. The induration is firm and is situated immediately beneath the vaginal wall and usually follows approximately the outline of the connective area. Ordinarily there is not much tenderness, unless there is complicating inflammation. The amount of fixation of the cervix depends on the extent of the infiltration.

13. **Myoma of Uterus,** growing into right broad ligament. The mass projects out from the side of the uterus, has a rounded well-defined outer border and is firm and not tender. The mass is fixed by a broad attachment to the side of the uterus but the uterus and mass together are movable in the pelvis, unless the mass is so large that it extends to the pelvic wall or there is complicating inflammatory fixation.

14. **Affection of Right Ureter.**—A mass about the ureter may be caused by inflammation in and around the ureter. The inflammation may be due to a stone lodged in the ureter or to tuberculous ureteritis or to an ascending pus infection. The mass is situated in the course of the ureter, is small at first and may give the impression of a small nodule like an enlarged gland in the tissues. It is firm, very tender, fixed, but not intimately attached to any of the adjacent organs until extensive infiltration has formed. A mass from the ureter is accompanied by bladder irritability and urinary abnormalities.

15. **Solid Tumor of Ovary or Tube,** bound down by adhesions and forced to grow towards the cervix. The mass would necessarily become of considerable size before reaching that region. It is approximately spherical, though of somewhat irregular outline. It is firm and usually somewhat tender because of the accompanying inflammation, but not so tender as an inflammatory mass of the same size would be. It is fixed in the pelvis and attached to all surrounding structures. The uterus is usually pushed far to the opposite side, but the history does not show the severe disturbance that would necessarily accompany a purely inflammatory mass of like size.

B. **Mass Contains Fluid (Fluctuation May be Obtained)**

1. **Pelvic Abscess** from salpingitis, with secondary involvement of connective tissue; or from primary cellulitis; or from suppuration in a fibroid tumor, in a cyst or in a hematoma in this situation. The mass usually fills in all the lower part of that side of the pelvis, and is surrounded by infiltration which shades off gradually into the surrounding tissues. The area of fluctuation is surrounded by induration. There is marked tenderness at the point of fluctuation, which diminishes usually as the periphery of the mass is reached. There is fixation of all the involved tissues and of the adjacent organs, including the uterus. The history and the findings elsewhere in the pelvis, indicate the seat of the primary inflammation.

2. **Pelvic Hematoma** usually comes from a tubal pregnancy, which has ruptured between the layers of the broad ligament. The induration runs down close around the cervix, and may be small or may fill all that side of the pelvis extending up to the top of the broad ligament. It has a general rounded outline, much more so generally than an inflammatory infiltration in the connective tissue, though it is limited anteriorly and posteriorly by the separated peritoneal layers of the broad ligament.

It is largely fluid and there is distinct fluctuation over a considerable area, as in a cyst. Also, there is not so much surrounding induration as in an abscess, though usually considerably more than in a cyst. The tenderness is not nearly so marked as in a collection of blood in the peritoneal cavity. Of course the tenderness varies somewhat, being more marked when the hemorrhage is recent and extensive, in which case it may be very marked. Ordinarily the tenderness from a hematoma is not nearly so marked as tenderness from an abscess. There is fixation of the mass in the situation in which it is found, and, if extensive, it fixes the uterus to the pelvic wall. The history and the findings elsewhere will show the cause of the trouble.

3. **Hydrosalpinx** coming low in the pelvis. The cystic mass runs up into the tubal region. It is somewhat elongated and sausage-shaped and extends from the upper angle of the uterus to the pelvic wall. It fluctuates freely and gives the impression of a thin-walled cyst. Frequently some induration from exudate or adhesions, may be felt. It is not tender ordinarily. It is somewhat movable, though not so much so as a small pediculated ovarian tumor. It is attached to the uterus and to the pelvic wall and along the upper part of the broad ligament.

4. **Parovarian Cyst** is situated near the center of the broad ligament and, if as large as an orange, it begins to come down about the cervix just beneath the vaginal wall. It is approximately spherical, though somewhat irregular in shape. It fluctuates freely throughout and the fluid seems very close to the examining fingers. There is no tenderness, unless complicated by inflammation or neuritis or other painful affection.

It is fixed, as a rule, but not firmly. The peritoneal layers of the broad ligament stretch sufficiently to permit considerable movement in some cases, especially later, when the cyst has become so large that it rises out of the pelvis. The uterus is displaced to the opposite side, and the cyst is attached to it and to the pelvic wall, but not intimately as a rule. If inflammation takes place about the cyst then there is marked fixation and attachment to all adjacent organs, and the cyst as it grows may elongate the body of the uterus.

5. **Ovarian Cyst** growing toward the cervix. An ovarian cyst which has been fixed in the pelvis by inflammation may grow in this direction. It presents the same characteristics as a parovarian cyst complicated by inflammation, except that fluctuation is not so uniform throughout the mass. There may be firm portions representing thick septa or small areolar cysts.

6. **Cystic Myoma** presents the ordinary characteristics of a myoma, except that there is a point of fluctuation and there may be some tenderness.

7. **Uterus Containing Fluid** and displaced to one side. This fluid in the uterus may be due to pregnancy, normal or abnormal, or to a cystic fibroid or to pus in the uterus or to blood in the uterus.

8. **Rudimentary Horn of Uterus,** containing blood or other fluid. There may be pregnancy in such a horn.

9. **Vaginal Cyst.**—Vaginal cysts may come from remnants of the wolffian duct or from aberrant gland structures in the vaginal wall. They protrude into the vagina more or less, are small and rounded, have fluctuation throughout with a thin wall and are not tender unless complicated. They are fixed in the lower part of the pelvis and lie just beneath the vaginal wall, to which they are closely attached.

10. **Ureter Greatly Dilated.**—The fluid in the dilated ureter may be urine (hydroureter) or pus (pyoureter). The upper part of the ureter and the kidney is usually dilated also (hydronephrosis, pyonephrosis). A fluctuating swelling is found in the region of the ureter, accompanied by symptoms of bladder irritation and urinary evidences of disease. The retained urine may be discharged at times through the bladder. The swelling then largely disappears, to reappear when the obstruction again occurs and the sac refills. A

careful investigation as to the amount and character of the urine discharged with the variation in the size of the mass, is an important step in the diagnosis of such a mass.

MASS LOW IN PELVIS, AND TO LEFT OF CERVIX

A. Mass or Induration **Firm** (No fluid felt). Same as on right side.

B. Mass contains **Fluid** (Fluctuation obtained). Same as on right side.

MASS LOW AND BEHIND CERVIX

A. Mass or Induration Firm

1. **Body of Uterus Displaced** backward to the 3rd degree (Fig. 96). Any of the various solid conditions of the uterus previously mentioned may be present.
2. **Salpingitis with Exudate** extending into the culdesac.
3. **Salpingitis with Prolapse** of the thickened tube into the culdesac (Fig. 754). The prolapsed tube may be movable or adherent.
4. **Salpingitis with Secondary Infiltration** of the connective tissue back of the uterus.
5. **Oophoritis with Prolapse** of the ovary. The prolapsed ovary may be movable or adherent. The characteristic palpation signs of a prolapsed ovary have already been given.
6. **Small Abscess** behind the cervix, from any of the above conditions and with such a thick wall that no fluctuation is obtained.
7. **Adhesions** behind the cervix, from any of the above affections.
8. **Cellulitis.** For the characteristic palpation signs of cellulitis, see under Mass to Right of Cervix.
9. **Small Abscess from Cellulitis,** with wall so thick that no fluctuation is obtained.
10. **Scar-Tissue from Former Cellulitis** is not nearly so frequent in this region as peritoneal adhesions.
11. **Scar-Tissue from Laceration in Labor** is found occasionally, though it is rare in this situation. Most of the deep lacerations extend laterally.
12. **Malignant Infiltration** from cancer of cervix uteri or from cancer of the rectum or from cancer of the bladder.
13. **Myoma of Uterus** growing posteriorly from the cervix or lower part of the corpus uteri.
14. **Affection of Ureter** with exudate extending back of the uterus. The differential diagnostic points of a ureteral mass have already been given.
15. **Solid Tumor of Ovary or Tube,** forced to grow into the culdesac.
16. **Fecal Mass in Rectum.**—Along the lower part of the posterior vaginal wall such masses cause no trouble in diagnosis, but in the region of the culdesac they may lead to a mistake. The characteristics of such a fecal mass are that it is situated in the course of the rectum, that it is not particularly tender, that it is of putty-like consistency and may be indented (the dent remaining) and that it may be moved along to another position in the canal.

If there is still doubt, direct the patient to take a purgative to give a good bowel movement and the next day an enema to clear out the large bowel, and then return for another examination.

17. **Tumor of Rectum.**—The mass is in the wall of the rectum and there are usually symptoms of rectal irritation, with the passage of blood and mucus.

18. **An Abdominal Organ Prolapsed** into the culdesac. A wandering kidney or spleen may be found in this situation. It may be movable or fixed. It presents somewhat the characteristics of the organ involved, i.e., it has about the size, shape, consistency and tenderness. If movable, it may be pushed back into the normal situation of the organ. An examination in the Trendelenburg posture may aid very materially in this. The knee-chest posture, taken for a few seconds, may cause the organs to return to the abdominal cavity. Careful examination may show the organ absent from its normal position. If it is the kidney, there may or may not be bladder symptoms or urinary abnormalities.

B. Mass, Behind Cervix, Contains Fluid

1. **Pelvic Abscess** from salpingitis, from oophoritis, from cellulitis, from hematocele or hematoma, from a suppurating solid tumor or from a suppurating cyst.

2. **Intraperitoneal Hemorrhage.**—This usually comes from tubal pregnancy, with rupture of the wall of the tube or abortion from the end of the tube into the peritoneal cavity. Blood in the peritoneal cavity presents one of three conditions, as follows:

a. The blood may be free in the cavity. This, like ascites, does not give rise to any distinct mass or induration, hence does not require consideration here. The characteristics of this condition are given in Chapter XI.

b. Clots and fibrinous exudate forming a mass about the affected tube and extending from the tube into the culdesac. This forms a mass. If there is a large amount of plastic exudate, the mass is rather firm and with definite outlines. If the mass is made up principally of recent blood clots, it is soft and the outlines indistinct. This condition is found in those cases where there are repeated slight hemorrhages. This is a dangerous state of affairs for, though the bleeding has stopped temporarily, any exertion, or a disturbance of the clots by an examination, may start a severe hemorrhage.

c. Some blood has run into the culdesac and a firm roof of fibrinous exudate has formed above it, shutting it off completely from the general peritoneal cavity. This condition is called pelvic "hematocele," and represents the least dangerous condition of intraperitoneal hemorrhage.

The physical signs of intraperitoneal clotted blood and exudate are practically the same as those of inflammatory exudate, with the exception of the temperature. There is usually but little fever after the first forty-eight hours, and in many cases not much at any time. Of course, if suppuration comes on later in the blood mass, then the ordinary signs of suppuration appear, including fever. The diagnosis of a blood mass, rather than an inflammatory mass, must rest largely upon the absence of decided fever in the presence of acute symptoms and upon certain points in the history and progress, indicating a tubal pregnancy. These points are given under tubal pregnancy in Chapter XI.

3. **Hydrosalpinx** low in the culdesac. The prolapsed and distended tube may be movable or adherent.

4. **Parovarian Cyst** pushing back behind cervix and filling the posterior part of the pelvis.

5. **Ovarian Cyst** in culdesac. A small ovarian cyst may easily drop into the culdesac. If it becomes adherent it will remain there, choking the pelvis as it enlarges.

6. **Cystic Myoma** presents the characteristics of a myoma, with fluctuation and some tenderness added.

7. **Uterus Containing Fluid** and displaced backward. The fluid in the uterus may be due to pregnancy or to a cystic fibroid in the wall or to pus or to blood.

8. **Small Cyst of Some Abdominal Structure** lying in culdesac. Such a cyst may come from the omentum, from the mesentery or from a prolapsed kidney or spleen.

9. **Ureter Greatly Dilated** (hydroureter or pyoureter) and filling in back of the uterus.

MASS LOW AND IN FRONT OF CERVIX

A. Mass or Induration Firm

1. **Uterus Displaced Forward.**—There may be any of the solid conditions of the uterus already mentioned.

2. **Myoma of Uterus** (Fig. 109).

3. **Malignant Disease** of cervix extending forward or of the urethra extending backward or of the vagina, may give induration in front of the cervix.

4. **Cellulitis,** between uterus and bladder. The characteristics of an induration from cellulitis have already been given.

5. **Bladder Disease.** This may be a tumor or tuberculosis or chronic inflammation.

B. Mass, in Front of Cervix, Contains Fluid

1. **Bladder Distended with Urine.**—Whenever, in making a bimanual examination, a cystic mass is felt in front of the uterus, catheterize the patient if necessary to eliminate a full bladder.

2. **Uterus Containing Fluid** is usually due to pregnancy, though it may rarely be due to pyometra or hematometra.

3. **Pelvic Abscess.**—A pelvic abscess in this situation is usually due to a cellulitis.

4. **Pelvic Hematoma.**—Occasionally a hematoma from tubal pregnancy will dissect in between the uterus and bladder and give a fluctuating mass in this region, but this is very rare.

5. **Vaginal Cyst** projects into the vagina, and the fluid appears to be just beneath the vaginal wall. Its joint of attachment is very low, apparently in the vesicovaginal septum.

6. **Parovarian Cyst.**—Such a cyst may grow in between the uterus and the bladder.

7. **Cystic Myoma.**—A myoma growing from the anterior part of the cervix may displace the bladder upward and give a mass just in front of the cervix.

MASS LOW AND FILLING PELVIS

A. Mass or Induration Firm

1. **Extensive Inflammatory Exudate** or infiltration, from salpingitis, oophoritis, peritonitis or cellulitis. This extensive inflammatory exudate fixes all the organs, as though plaster of Paris had been run in around them and had hardened there. On making the vaginal examination there is found a firm roof above the examining fingers.

2. **Extensive Bleeding** in the pelvis, in the form of hematoma or hematocele or blood clots without limiting roof of exudate.

3. **Large Myoma** in lower part of uterus. This may be any one of the various forms of fibromyoma.

4. **Malignant Disease** of cervix or corpus uteri or of bladder or of rectum. There may be malignant disease and fibroid.

5. **Tumor from Pelvic Wall.**

B. Mass, Low and Filling Pelvis, Contains Fluid

1. **Uterus Pregnant.**—The enlarged and fluctuating uterus may be in normal position or in displacement. It may be regular in shape or very irregular.

2. **Parovarian Cyst** may grow low in the pelvis and fill it, displacing the organs in various directions.

3. **Ovarian Cyst.**—An ovarian cyst bound down by adhesions may fill the pelvis and extend to the lower part of it. There may be some complicating condition, for example, an ovarian cyst and pregnancy.

4. **Pelvic Abscess** with extensive exudate or infiltration may fill the pelvis. The point of fluctuation is usually behind the cervix. Most of the mass is firm, and there is the firm inflammatory roof previously mentioned.

5. **Collection of Blood** in pelvis may be present in the form of hematoma or hematocele. In addition to an area of fluctuation, there is usually the firm roof due to accompanying infiltration and exudate.

MASS HIGH, IN PELVIS OR LOWER ABDOMEN, RIGHT SIDE

A. Mass or Induration Firm

1. **Uterus Displaced.**—Any one of the various solid conditions of the uterus previously mentioned may form a mass in the center of the pelvis or to one side.

2. **Salpingitis.**—There may be simply a thickened tube or a large mass of exudate.

3. **Pyosalpinx,** with small amount of pus and such a thick wall that no fluctuation is obtained. There may be very little peritubal exudate or a great deal.

4. **Oophoritis,** without any cyst large enough to give fluctuation. There may be little or no exudate or there may be a large amount of exudate.

5. **Adhesions,** from any of the above conditions. The adhesions may be slight or extensive.

6. **Cellulitis,** in upper part of broad ligament, or resulting scar-tissue from same.

7. **Thrombosis of Veins of Broad Ligament,** though rare, probably occurs more frequently than is generally supposed.

8. **Solid Tumor of Ovary or Tube** may be small or large, movable or adherent.

9. **Extrauterine Pregnancy** may be tubal pregnancy or pregnancy in a rudimentary horn of the uterus. For the special evidences of extrauterine pregnancy see Chapter XI. Tubal pregnancy, with its resulting hemorrhage and plastic exudate and adhesions binding together the various structures and giving a tender mass in the tuboovarian region, is most frequently mistaken for an ordinary inflammatory mass.

10. **Pelvic Tuberculosis.**—The mass presents the characteristics of a chronic inflammatory mass, which in fact it is. The fact that the inflammation is tuberculous must be determined by other features of the case than the pelvic palpation. For these other diagnostic points, see pelvic tuberculosis in Chapter XI.

11. **Myoma of Uterus** is subperitoneal and may be pediculated or sessile.

12. **Appendicitis with Exudate.**—The mass is situated about the appendix and the history points to bowel trouble, rather than to tubal trouble. In some cases the appendix extends into the tubal region, causing more or less confusion in diagnosis.

13. **Fecal Mass,** in cecum and extending along the ascending colon.

14. **Tumor of Cecum is usually malignant.**—It presents chronic irritation in the cecal region, generally leading to a diagnosis of chronic appendicitis.

There are exacerbations of trouble at times, due apparently to irritation in the cecum from retained fecal material. In some cases there is a swelling in this region, that comes and goes. It is most marked usually during the days of pain and disappears largely when the bowels are well opened. Later a permanent mass appears, though it may vary considerably in size at different times, due to the varying amount of fecal material in the cecum. This same history may be present at times in chronic cecitis without a tumor, but in such a case of course there is no permanent tumor, unless there is some complicating inflammatory trouble around the cecum.

15. **Intussusception.**—The mass extends along the cecum and ascending colon. There is the history of intestinal obstruction, the passage of bloody mucus from the bowel and the rectal tenesmus. It is most frequent in children.

16. **Displaced Kidney.**—The deep-seated mass has approximately the size and shape of the kidney and is tender when pressed upon. Pressure usually causes a desire to urinate, and it may cause pain running along the ureter to

the bladder. The prolapsed kidney is usually somewhat enlarged. Unless adherent in its malposition, it may be returned to its bed in the loin. This facility with which the kidney slips up into its bed when the patient is lying on her back, sometimes interferes with the diagnosis, for palpation then would show no displacement of the kidney. In order to prevent a prolapsed kidney from being pushed into place unawares, during palpation in the vicinity, it is well to grasp the lumbar region firmly, as shown in Fig. 38. This fixes the kidney in its abnormal position, where it can be palpated by the fingers of the other hand, as shown in Fig. 39. Another way to examine a movable kidney in its lowest position, is to palpate the loin while the patient is standing. The patient must lean forward on some support in such a way as to relax the abdominal muscles.

17. **Tumor of Kidney.**—Such a mass may be traced up into the kidney region. If the tumor and kidney are prolapsed, they may be returned to the loin, if not adherent. There are usually dragging pains in the loin, and bladder symptoms. Urinary examination may give decisive information. A very satisfactory method of palpating the kidney region for a mass, or for deep tenderness, is to use both hands, one behind and the other in front, the lumbar structures being caught between them.

18. **Perinephritic Abscess,** without distinct fluctuation. This may dissect down into the lower abdomen, and even into the pelvis, and still be so deeply situated as not to give definite fluctuation, except under anesthesia. The mass may be traced up into the kidney region. There is colon resonance over it. There is marked tenderness in the lumbar region, and usually decided swelling there. There is the history and the ordinary signs of kidney disturbance, associated with the general and local evidences of suppuration.

19. **Psoas Abscess,** without distinct fluctuation, causes a deep seated mass in the lower abdomen, which may give no fluctuation until it approaches the surface in the neighborhood of Poupart's ligament. As it is usually tuberculous, the marked local tenderness and the high fever and chills of ordinary deep suppuration are generally absent. A careful examination, however, will show more or less fixation of the thigh. When an attempt is made to move the thigh in any direction that pulls the psoas muscle, the movement is resisted. There are also other evidences of caries of the lumbar vertebrae.

20. **Enlarged Liver or Solid Tumor of Liver.**—The liver occasionally becomes so enlarged from disease or abscess formation that its lower border is pushed into the right lower abdomen. The direct connection of the mass with the usual liver dullness may be demonstrated, and the lower border and left border of the mass has the shape of the liver and there is a history indicating liver disease. A tumor from the liver usually lies in front of the intestines and its connection with the liver may be directly shown by palpation and percussion. There is also a history of liver disturbance.

21. **Movable Liver.**—Exceptionally the liver may be so movable that it sinks into the lower abdomen. The mass lies in front of the intestines, has the shape of the liver and may be returned into the liver region unless adherent.

22. **Tumor of Abdominal Wall** (Fig. 189) is a rare condition, and for

that reason it is likely to be forgotten, resulting in a mistaken diagnosis. The distinguishing signs of a tumor of the abdominal wall are given in the first part of this chapter.

23. **Inflammatory Mass in Abdominal Wall** presents about the same signs as a tumor of the wall, with evidences of inflammation added.

24. **Tumor of Round Ligament.**—It arises somewhere in the course of the round ligament, either in the pelvic cavity or in the inguinal canal. If large, it necessarily produces great distortion of the parts. It may cause much confusion in diagnosis if the fact be not remembered that a tumor occasionally arises from this ligament.

25. **Some Central Abdominal Mass.**—One of the firm masses mentioned as usually appearing in the central abdomen, may be displaced to one side or may become so large that it extends far over to both sides.

26. **Mass from Opposite Side.**—Occasionally an enlarged organ or a tumor from one side will become so much displaced as to appear to belong to the other side.

B. Mass, High in Right Side, Contains Fluid

1. **Uterus Displaced.**—The fluctuation may be due to pregnancy or, very rarely, to pyometra or to hematometra.

2. **Pyosalpinx.**—There is a tender mass in the tuboovarian region, with slight or well-marked fluctuation. The mass is fixed and the uterus also is fixed. There may be a large amount of firm exudate or very little. There is usually a clear history of infection followed by the usual evidences of pelvic inflammation, including persistent endometritis with discharge. If the trouble is gonorrheal, the symptoms may be mild, and if of long standing the pus-tube may not be very tender. But there is more tenderness and more thickening and fixation than occurs with hydrosalpinx or ovarian cyst or parovarian cyst.

3. **Ovarian Abscess** presents practically the same history and the same signs as a tubal abscess. In fact, it is sometimes impossible to say with absolute certainty whether the pus is in an enlarged tube or an enlarged ovary. As the former is the usual condition, we assume in a given case, that the pus is in the tube, unless there is something special pointing otherwise. Occasionally in an abscess in this region, the form can be made out as distinctly round (probably ovary) or distinctly long and sausage-shaped (tubal).

4. **Tubal Pregnancy** presents the history and examination signs of an inflammatory mass, with the history and progress of tubal pregnancy. There is, in the class of cases now under consideration, sufficient fluid blood encapsulated somewhere to give fluctuation, either about the tube or in the posterior culdesac.

5. **Pelvic Tuberculosis.**—There are the signs of a chronic inflammatory mass, with a collection of fluid (tuberculous pus), and the history and progress of the case present the characteristics of local tuberculosis, as explained in Chapter XI.

6. **Hydrosalpinx.**—Hydrosalpinx is about the same as ovarian cyst except that it is oblong and extends from the uterus to the pelvic wall and is attached

along the border of the broad ligament. The signs are much like those due to parovarian cyst, except that the hydrosalpinx is situated high while still small. There may or may not be a history of pelvic inflammation at any time. Its intimate attachment to the uterine horn is an important diagnostic point.

7. **Ovarian or Parovarian Cyst.**—A fluctuating mass, somewhat movable, of slow growth, with no acute symptoms if not complicated, unless caught in the pelvis, and there is considerable abdominal enlargement before very troublesome symptoms appear. The mass is attached in the pelvis and, by further examination, its attachment may be traced to the tuboovarian region.

8. **Cystic Myoma.**—The greater portion of the mass is usually solid and presents the characteristics of a uterine myoma.

9. **Large Perityphlitic Abscess** presents the history of appendicitis with persistent septic symptoms, and the evidences of a pus collection in the vicinity of the cecum.

10. **Cystic Tumor of Kidney.**—The tumor may be traced up toward the loin. It is freely movable usually, unless there has been inflammation about it. Good fluctuation is not obtained through a moderately thick abdominal wall, unless there is some large cavity or a number of small ones with very thin walls. The tumor may be made up of innumerable small cysts and yet, in the ordinary examination, appear as a solid tumor. Under anesthesia the fluctuation may usually be distinctly made out. Tenderness is slight unless there is complicating inflammation. The enlarged kidney is usually displaced downward considerably, so that there is room in the loin up into which it may be pushed. The colon lies over the mass, between it and the abdominal wall. This may not be apparent at first, the colon being flattened out against the wall and causing no resonance on percussion. The fact that the colon is over the mass is easily demonstrated by inflating the rectum and colon with air.

11. **Hydronephrosis and Hydroureter.**—Occasionally the kidney and ureter on one side will become very much dilated, forming a sac filled with fluid (urine). There is usually a history of kidney pains and bladder disturbance extending over a long period and varying much at different times. The characteristic feature is that the sac fills at times, producing a swelling with more or less tension and pain, and then after a variable time there is a discharge of a very large quantity of urine with disappearance of the swelling and relief of the symptoms. After a time the sac fills again and discharges. A crucial point in the diagnosis of such a condition is the coincidence of the disappearance of the swelling and the discharge of an extraordinarily large quantity of urine. Too much dependence should not be placed on the history, as it is more or less uncertain and may lead to an erroneous conclusion. Before the patient is subjected to operation, in cases where the symptoms are not urgent, she should be required to make daily measurements of the amount of the urine passed during one of the periods of appearance and disappearance of the swelling, in order that any marked increase in the amount of urine, as the swelling disappears or diminishes, may be known positively.

12. **Pyonephrosis.**—When the dilated kidney or ureter becomes filled with

pus, there is marked disturbance, with fever, chills, pains extending from kidney to bladder, usually marked bladder disturbance and definite urinary findings. Palpation of the kidney and along the course of the ureter gives marked tenderness. An important feature in these cases of painful kidney trouble is the point-tenderness on deep pressure in the lumbar just over the kidney (Fig. 212). This helps to differentiate kidney-tenderness from tenderness due to appendiceal or other intraperitoneal inflammation, which differentiation may in some cases be practically impossible by palpation in front. Usually, however, careful palpation in front will show clearly that the tenderness is in the kidney and along the course of the ureter.

13. **Perinephritic Abscess,** large enough to give fluctuation may burrow into the pelvis or towards Poupart's ligament. It gives deep fluctuation and presents the symptoms and signs of deep suppuration in the kidney region.

14. **Psoas Abscess,** large enough to give fluctuation may burrow into the pelvis, or beneath Poupart's ligament to the femoral opening. It presents fluctuation, both superficial and deep, and gives the symptoms and signs of tuberculosis of the lumbar vertebrae with involvement of the psoas muscle.

15. **Dilated Gall Bladder.**—Occasionally the gall bladder becomes so greatly enlarged and displaced, that it extends into the lower abdomen. The connection of the fluctuating mass with the liver may be traced, and there is a history of gall stone disease or other liver disturbance.

16. **Central Abdominal Affection.**—One of the cystic masses mentioned as usually appearing principally in the median line, may be displaced to one side or may become so large that it extends far over to both sides.

17. **Mass from Opposite Side.**—Occasionally a cystic mass from one side will become so much displaced that it appears to belong to the opposite side. In a case operated recently, there was an ovarian cyst extending to the umbilicus. The history indicated that it had been unusually movable, occupying various positions, in the lower abdomen. When seen, the patient had been sick in bed several days with abdominal pains and evidences of a mild peritonitis. The large fluctuating mass occupied the left and central portions of the lower abdomen and pelvis. The small uterus was crowded into the posterior part of the pelvis behind the cyst. The cystic mass was not very tender, but it was fixed immovably by adhesions. From its location there seemed no room for doubt that it arose from the left side. On opening the abdomen, however, it was found that it was a right ovarian cyst which had fallen over to the left side in front of the uterus. The pedicle had become twisted, with resulting hemorrhage into the cyst and fibrinous peritonitis about it. To the torsion of the pedicle, with the resulting hemorrhage and peritonitis, were due the acute symptoms and the recent fixation of the cyst.

MASS HIGH, IN PELVIS OR LOWER ABDOMEN, LEFT SIDE

A. **Mass or Induration Firm**

Same as on right side, substituting Sigmoid flexure for Cecum, and Spleen for Liver, and leaving out Appendicitis.

B. Mass Contains Fluid

Same as on right side, substituting Cyst of Spleen for dilated Gall Bladder, and leaving out Perityphlitic Abscess.

MASS HIGH AND IN MEDIAN LINE

In Pelvis or Lower Abdomen or Central Abdomen

A. Mass or Induration Firm

Any of the solid masses mentioned as occurring in the right or left side, may extend to the median line or across it.

There are, however, certain firm masses that arise in or near the median line and, consequently, may be classed as belonging to this median region.

1. **Solid Tumor of Uterus.**—Myomata are the most frequent cause of firm enlargement of the uterus, though occasionally a malignant tumor of the corpus uteri will cause marked enlargement. The characteristics of these have already been given. There may exceptionally be both myoma and carcinoma.

2. **Abdominal Pregnancy and Lithopedion** (see Chapter XI).

3. **Solid Tumors of Omentum, Small Intestine or Mesentery** usually appear near the median line, and the signs vary with the location. The diagnosis rests upon the presence of a mass presenting the symptoms and signs to be expected in a tumor from one of these structures, and for which no more common disease would account. Such tumors usually are accompanied by gastrointestinal symptoms.

4. **Tumor of Pancreas.**—A deep-seated mass in the median line, accompanied by decided evidences of pancreatic disturbance, and presenting symptoms and signs for which nothing else will account.

5. **Retroperitoneal Tumor** (Fig. 220) lies back of the intestines, is rather movable, more so than would be expected from a pancreatic tumor, and is without evidences of disturbance of any particular organ.

6. **Enlarged Lymphatic Glands.**—This condition presents the evidences of a retroperitoneal or mesenteric mass, accompanied with a disease causing glandular enlargement, such as Hodgkin's disease, or with recent ulceration in the intestine (tuberculous or typhoid).

7. **Tuberculous Peritonitis,** without enough fluid to give fluctuation. Tuberculous inflammation, with the exudate and resulting mass, may occur at any part of the peritoneal cavity, but is likely to extend into the median line, if not there primarily. The patient presents the evidences of a chronic or subacute peritonitis with nothing else to account for it, and the presence of tuberculosis in the intestines or in the lungs.

8. **Displaced Abdominal Organ.**—Several cases are recorded in which a displaced organ, such as the kidney or the spleen, has led to an erroneous diagnosis and an erroneous operation.

B. Mass, High and in Center, Contains Fluid

Any of the fluid masses mentioned as occurring in the right or left side, may extend to the median line or beyond it.

There are, however, certain fluctuating masses that arise in the median line and hence may be said to belong to this region.

1. **Pregnant Uterus** may be any size, may be normal or abnormal, and the shape of the uterus may be regular or irregular.

2. **Cystic Myoma** presents the evidences of a myoma along with fluctuation in a part of it. Where such a condition is found, be careful to exclude pregnancy complicating the myoma.

3. **Distended Bladder** may cause much confusion in examination and diagnosis. The diagnostic points have already been given. It has happened that the unrecognized distended bladder ruptured with fatal results.

4. **Ovarian or Parovarian Cyst.**—The diagnostic points for ovarian or parovarian cyst have been given briefly in this chapter, and are given in detail in Chapter XII.

5. **Ascites.**—For the differential diagnosis of ascites, see text and illustrations under Percussion in this chapter.

6. **Ascites and Tumor.**—The important percussion signs of ascites and tumor have already been mentioned and illustrated in the preceding chapter (Figs. 45 to 51).

7. **A Cystic Tumor of Omentum, Intestine or Mesentery.**—A considerable number of cystic tumors of the omentum and mesentery have been reported. Such tumors may cause much confusion in diagnosis, unless it be kept in mind that they may be encountered. The symptoms and signs they present depend on the situation, and may be worked out for the different situations by a consideration of the surrounding structures and the signs that would likely result. The diagnosis depends largely on the exclusion of the more common conditions.

8. **Pseudocyst of the Lesser Omental Cavity** is usually preceded some months by an abdominal injury involving the pancreas. It is likely to be of rather slow growth, and the injury may be overlooked unless the history is carefully inquired into. In all cystic masses of doubtful character near the center of the abdomen, this should be considered.

9. **Cyst of Pancreas.**—A true cyst of the pancreas may present much the same symptoms and signs as the pseudocyst of the lesser omental cavity resulting from an injury of the pancreas. Space cannot be taken to give in detail the differential diagnosis of these various upper abdominal conditions. The author wishes simply to call attention to the conditions that may be encountered, and the presence or absence of which must be determined by the examiner through further study.

10. **Cyst of Urachus.**—This and other rare abnormalities are occasionally met with. A cyst of the urachus is found in or near the median line, and between the peritoneum and the anterior abdominal wall. It may communicate with the umbilicus, causing an intermittent discharge there, or with the bladder or with neither.

POINTS IN THE SPECULUM EXAMINATION

In the speculum examination, direct inspection is made of the vaginal wall and the cervix.

Conditions of Vaginal Wall

The vaginal wall may present arterial congestion, venous congestion, bleeding areas or distinct ulceration.

Arterial Congestion of the Vaginal Wall indicates inflammation, usually acute, or active irritation, as by an irritating discharge or pessary or other foreign body. The differential diagnosis of the various forms of vaginal inflammation has already been given in this chapter, when considering leucorrhea. Occasionally there are cases of chronic vaginitis in which there is arterial congestion in spots. In such chronic cases there is likely to be infiltration and hypertrophy of the congested areas, giving rise to the condition known as granular vaginitis.

Venous Congestion of the Vaginal Wall should always arouse a suspicion of pregnancy, for that is the most common cause. It may be caused, also, by a tumor or other pelvic mass that interferes with the vaginal circulation, or by extrapelvic conditions that cause venous stasis in the pelvis, such as heart disease with failing compensation.

Bleeding Areas on Vaginal Wall, without a distinct ulcer, are found principally in senile or adhesive vaginitis, which is described in Chapter IV.

A Distinct Ulcer on the Vaginal Wall may be simple, chancroidal, syphilitic, tuberculous or malignant. In the case of a malignant ulcer, it may be primary on the vaginal wall or it may be secondary, the most common source of secondary malignant ulceration of the vaginal wall being carcinoma of the cervix uteri.

Conditions of Cervix Uteri

The appearance of the normal **virgin** cervix is shown in Figs. 134 and 135. The appearance of the approximately normal cervix in the parous woman is shown in Fig. 136, and a cervix that has undergone the senile atrophy is shown in Fig. 137. Fig. 138 shows **discharge** from an unlacerated cervix, while Fig. 139 shows discharge and laceration. Erosion of the cervix is a very common condition, being present to a greater or less extent in most cases where there is an irritating discharge. Fig. 139 shows **erosion** of the cervix, the shaded area extending out from the external os representing the red angry-looking erosion. Various appearances of **lacerated** cervix, as seen through the speculum, are shown in Chapter VI. In a considerable proportion of cases, distinct lips are not at first apparent, the lacerated cervix having the appearance of a ball (Fig. 83). In such a case, if the anterior and posterior portions of the cervix be caught with a forceps or tenaculum and brought together, as indicated in Fig. 84, the extent of the laceration becomes apparent.

Malignant disease of the cervix causes many thousands of deaths annually and yet in the beginning it is entirely local and, when recognized early, can be completely removed. The diagnosis is considered in detail in Chapter IX. Here the author wishes simply to call attention to the fact that beginning malignant disease may make very little change in the general appearance of the cervix. Any suspicious area should be carefully investigated and, if necessary to a positive diagnosis, a small piece should be excised for microscopic examination. Beginning malignant disease of the cervix in its various forms is described and illustrated in Chapter IX.

PAIN IN PELVIS OR LOWER ABDOMEN

Pain in the pelvis or lower abdomen may be due to:

1. **Salpingitis, Acute or Chronic.**—Pain referred to tuboovarian region (Fig. 207). History of preceding uterine inflammation, with cause for same. If chronic, history of preceding exacerbations. On abdominal palpation, tenderness in tuboovarian region. On vaginal and bimanual examination, there is found vaginal discharge (evidence of preceding uterine inflammation) and marked tenderness in tubal region. Mass is indurated, extending up to uterine horn and out to pelvic wall. Fixation of upper part of uterus and pain on movement of uterus. Absence of special signs of tubal pregnancy or of chronic oophoritis. Mass may be solid (consisting only of exudate or infiltration) or may give more or less fluctuation, due to serous fluid (hydrosalpinx) or to pus (pyosalpinx). All these conditions are included under the term salpingitis.

2. **Oophoritis, Acute or Chronic.**—Acute or subacute inflammation of the ovary ordinarily presents practically the same diagnostic points as salpingitis, is usually associated with, and overshadowed by, the salpingitis and is included under the general term "pelvic inflammation." There is, however, one rather common form of oophoritis not associated with salpingitis, namely, the cystic or cirrhotic form. When not associated with salpingitis or peritoneal exudate, there is felt on bimanual examination, a tender mass in the tuboovarian region—rounded, about the size of the ovary or larger, softened, with occasionally a fluctuating area, movable, often lying lower than the ovary usually does (prolapse of ovary behind uterus) and when pressed upon produces a peculiar sickening pain. There is absence of peritoneal exudate and there is no fixation.

3. **Pelvic Cellulitis.**—Signs same as in salpingitis except induration very hard (unless collection of pus) and occupying connective tissue areas, situated lower at side of uterus and intimately connected with uterus or pelvic wall.

4. **Endometritis, Acute or Chronic.**—Pelvic pain slight, sense of weight and pressure in the pelvis. Uterine discharge, excessive menstruation, tenderness of uterus, no induration or marked tenderness outside uterus.

5. **Backward Displacement of Uterus.**—If uncomplicated, the pelvic pain is slight but there is a sense of pressure and weight. Body of uterus absent in front of cervix. Back of cervix can be felt a mass which, on further investigation, proves to be the body of the uterus.

6. **Myoma of Uterus.**—Unless tumor is very large and chokes pelvis,

pelvic pain is slight but there is a sense of weight and pressure. Frequently uterine discharge and excessive menstruation. No history of uterine infection or attacks of pelvic inflammation. Firm mass firmly attached to uterus, not tender, not movable separately from uterus, but uterus and mass movable together in pelvis (i.e., no fixation of uterus and mass to pelvic wall) except when tumor is so large as to fill pelvis. In deep seated myomata, mass may appear as an enlarged uterus.

7. **Cancer of Uterus.**—Leucorrhea, with occasionally a streak of blood. No pain at first but later, when uterus is much enlarged (cancer of corpus) or infiltration involves parametrium (cancer of cervix), pain appears. If in the cervix, there is indurated area or an ulcer that resists treatment, a piece should be excised for microscopic examination. If from the body of uterus, there is a leucorrheal discharge or a blood-streaked discharge that resists treatment, the interior of the uterus should be curetted and the scrapings examined microscopically. In the later stages there is a bleeding mass, with indurated margins, at site of cervix, or a bloody, watery, foul-smelling discharge from the interior of the uterus. A bloody, foul-smelling, watery discharge does not necessarily mean cancer. It may be due to a fibroid, the differential diagnosis being made by microscopic examination of clippings or curettings, when necessary.

8. **Painful Menstruation (Dysmenorrhea).**—Pain due to menstruation alone, occurs only at the menstrual periods, though pain from most any pelvic disease may be much increased at the menstrual period, on account of the menstrual congestion and increased nerve sensitiveness. The various causes of dysmenorrhea and the differential diagnosis, are given in Chapter XIV.

9. **Pregnancy, with Threatened Miscarriage.**—Pains are usually somewhat paroxysmal, missed menses, morning sickness, pains in breasts, beginning softening of cervix, uterine body enlarged and softened, elasticity of middle segment (Hegar's sign), bluish coloration of vaginal walls and cervix.

10. **Incomplete Miscarriage.**—History of early pregnancy, pain and passing of blood clots or "pieces of flesh," followed by a bloody discharge and occasional pains. The pains are usually slight (unless infection has taken place), the principal symptom being the persistent bloody discharge. Cervix and body of uterus softened. Cervix open, and sometimes pieces of membrane and of blood clot may be felt projecting out of it.

11. **Tubal Pregnancy.**—Missed menses, morning sickness, uterus slightly enlarged and softened, tender mass in tubal region. Diagnosis on these signs not justifiable, unless previous examination of pelvis has shown it free from tubal or ovarian inflammatory trouble. If rupture takes place, pain and tenderness are so marked and so severe at first as to preclude satisfactory palpation of tuboovarian regions. If hemorrhage is severe, pulse is affected. If slight, pain disappears and mass can be made out beside uterus or behind it. The signs at this stage (slight peritoneal hemorrhages and resulting peritoneal irritation and exudate) are the same as for acute salpingitis with exudate, with the following special features:

a. Bloody vaginal discharge, beginning within a few days after onset of pain and continuing in an irregular way from one to several weeks.

b. Only slight fever or none. With enough acute inflammation to cause such severe symptoms, there should be considerable and persistent fever.

c. Evidence of internal hemorrhage, to a greater or less extent.

d. Exacerbations of pain without apparent cause and without decided elevation of temperature.

e. Absence of recent intrauterine pregnancy (miscarriage and infection are very common causes of ordinary salpingitis).

12. **Pelvic Tuberculosis.**—Evidences of pelvic inflammation (tenderness, induration or mass beside or behind the uterus or filling pelvis, fixation of uterus, fever and exacerbations), with the special features given for pelvic tuberculosis in Chapter XI.

13. **Tumor of Ovary, Broad Ligament or Fallopian Tube.**—A mass (usually soft, fluctuating) in tuboovarian region, not tender, usually freely movable. Not intimately attached to uterus, no fixation of uterus unless mass is large enough to displace uterus to side of pelvis. Ovarian growths are usually freely movable and tend to rise out of the pelvis, while broad ligament growths are held firmly within the broad ligament and cause pain and uterine displacement while still small.

14. **Laceration of the Pelvic Floor.**—Loss of support in pelvic floor causes more or less dragging and pressure in pelvis (though rarely severe pain), present principally when patient is on her feet, much relieved when she lies down. Feeling of weakness at pelvic outlet, and may be protrusion of parts (colpocele, cystocele, rectocele, prolapse of uterus). Examination shows marked loss of support in pelvic floor.

15. **Acute Vaginitis.**—Pelvic pain slight and very low (more of pressure and weight and burning), free discharge, vulvar and urethral irritation. Examination shows purulent discharge and evidences of acute inflammation of vagina.

There are a number of **extragenital diseases** that may cause pain in the pelvis and lower abdomen and that may be confounded with gynecologic affections, and that consequently must be taken into consideration in differential diagnosis. Among them may be mentioned the following:

16. **Appendicitis.**—Pain more diffused through abdomen and about umbilicus at beginning of attack. Tenderness at McBurney's point, and no particular tenderness over tube. Mass in appendix region, and not in tuboovarian region. Attacks associated with gastrointestinal symptoms rather than with uterine symptoms, though pain may be worse at menstrual periods on account of menstrual congestion. Mass may involve both regions—if in virgin probably appendicitis, if in married woman probably salpingitis.

17. **Mucous Colitis.**—Causes severe attacks of pain in lower abdomen and pelvis, and has frequently been mistaken for uterine or tubal or ovarian disease. Patients have been given pelvic treatment for months and years and have even had the ovaries removed when the trouble was none other than this peculiar affection of the colon. The affection is known by various names, such as membranous enteritis, tubular diarrhea and mucous colic.

Osler states: "It is a remarkable disease, to which attention has been paid for several centuries. It is an affection of the large bowel characterized by the production of a very tenacious, adherent mucus, which may be passed in long strings or as a continuous tubular membrane. I have twice had opportunity of seeing the membrane *in situ,* closely adherent to the mucosa of the colon, but capable of separation without any lesion of the surface. According to W. A. Edwards, 80 per cent of the recorded adult cases have been in women. The cases are almost invariably seen in nervous or hysterical women or in men with neurasthenia. All grades of the affection occur, from the passage of a slimy mucus like frog-spawn to large tubular casts a foot or more in length. Microscopically the casts are, as shown by Sir Andrew Clark, not fibrinous but mucoid and even the firmest consist of dense, opaque, transformed mucus. It is due to a derangement of the mucus glands of the colon, the nature of which is quite unknown. The disease persists for years, varying extremely from time to time, and is characterized by paroxysms of pain in the abdomen, tenderness, occasionally tenesmus, and the passage of flakes or long strings of mucus, sometimes of definite casts of the bowel. The attacks last for a day or in some cases for ten days or two weeks. Mental emotions or worry of any sort seem particularly apt to bring on an attack. Occasionally errors in diet or dyspepsia precedes an outbreak. Membrane is not passed with every paroxysm, even when pains and cramps are severe. There are instances in which the morphia habit has been contracted on account of the pain. There may be marked nervous symptoms, and authors mention hysterical outbreaks, hypochondriasis and melancholia. The diagnosis is rarely doubtful (when this affection is in mind) but it is important not to mistake other substances for membranes, thus the external cuticle of asparagus and undigested portions of meat and sausage skins, sometimes assume forms not unlike mucus casts, but microscopic examination will quickly differentiate them."

This affection may prove confusing when associated with endometritis or other pelvic lesion. The points in the differentiation of mucous colitis from a serious painful pelvic disease, are the character of the pain (resembling intestinal cramps extending throughout the lower abdomen), the passage of characteristic masses of mucus in some of the attacks and the absence of any palpable pelvic lesion to account for the symptoms.

18. **Other Intestinal Affections**—digestive disturbance, enteritis, colitis, dysentery, typhoid fever, chronic constipation (with distention and toxemia), intestinal tuberculosis. Each of these may cause pain in the lower abdomen and, if there happens to be accompanying uterine symptoms, may lead to a mistaken diagnosis. Pain is more widespread and variable. Tenderness on palpation is more general and ill-defined, all the lower abdomen being more or less tender and the tenderness may extend above the umbilicus and into the flanks. Uterine and tuboovarian region not especially tender. No palpable lesion in pelvis to account for symptoms. Special gastrointestinal symptoms elicited on questioning.

19. **Peritoneal Tuberculosis.**—This very closely resembles ordinary chronic pelvic inflammation in its symptoms and course. The differential diagnostic points are given in Chapter XI.

20. **Kidney or Ureteral Affections**—movable kidney, nephrolithiasis. pyonephrosis, ureteritis, and tuberculosis of kidney or ureter. Each of these affections causes attacks of pain, involving the lower abdomen and pelvis. Pain begins in kidney region and extends downward along ureter to bladder. There may or may not be accompanying bladder disturbances (frequent or painful urination, vesical tenesmus). On examination, tenderness is found in the kidney region (Figs. 210 to 212) and along ureter, and there may be displacement or enlargement of kidney. On bimanual examination there is tenderness in bladder or along ureter and no palpable lesion of genital organs sufficient to account for symptoms. There are pathologic findings in the urine.

21. **Bladder or Urethral Inflammation or Tumor.**—History of bladder symptoms (frequent or painful urination, vesical tenesmus, urinary changes). On examination, tenderness is confined to urethra, bladder or ureters, there are pathologic findings in urine and no palpable lesion of genital organs sufficient to account for the symptoms. If the case is still doubtful, instrumental examination of urethra, bladder or ureters may give decisive information.

22. **Rectal and Anal Diseases**—proctitis, hemorrhoids, fissure, new growths. History of rectal symptoms (pain on defecation, discharge of mucus and perhaps blood at times, protrusion of hemorrhoidal mass). On examination, tenderness and other abnormalities are found about anus and extending up along course of rectum. No palpable lesion in genital organs to account for symptoms.

23. **Nervous Diseases**—transverse myelitis, neurasthenia, hysteria, pelvic neuralgia. The history indicates disturbance of the nervous system, there are the special features of one of these nervous affections and there is no palpable lesion of genital organs sufficient to account for the symptoms. Pelvic tenderness is confined to the pelvic nerve strands or to the otherwise apparently normal ovaries. For thorough pelvic examination it may be necessary, in order to overcome muscular tension, to examine under anesthesia.

24. **Coccygodynia Painful Coccyx.**—The painful affections of this bone, either following injury or of spontaneous origin, are often mistaken for some genital or rectal affection. The pain is described by the patient as at the very end of the spine, and may radiate from there into the pelvis or down the thigh. It is noticed especially in positions that occasion movement of the bone (the act of sitting or rising, or straining at stool, or walking up or down stairs) or that cause pressure on the bone (resting on hard surface, riding on rough road). On examination with the finger in the rectum and the thumb outside on the bone (Fig. 151), there is marked tenderness on palpation of the bone and pain on movement of same. There may be deformity, indicating previous injury or inflammation. The marked tenderness is limited to the region of the coccyx. There is no palpable lesion of the genital organs to account for the symptoms.

BACKACHE

Pain in the back is a very common symptom in gynecologic patients. However, it is not always due to the pelvic disease, in fact, is often due to some entirely different trouble. As it has many causes, its diagnostic significance in each case must be determined by careful investigation as previously indicated (Chapter I, Localization of Backache).

Backache from Genital Diseases

Backache may be caused by any of the genital affections just mentioned under "pain in the pelvis or lower abdomen." It is not necessary to repeat them here. The pain in the back due to intrapelvic disease is usually diffuse across the sacrum. Definite tenderness on palpation is not ordinarily a part of this type of backache, though tender areas due to other conditions may be associated with it.

Though retrodisplacement of the uterus causes backache frequently, it does not do so in all cases or as uniformly as popularly supposed. A considerable proportion of patients with retrodisplacement have no pain in the back. One condition that causes a most persistent and annoying backache is parametritis posterior, and it is frequently overlooked in a pelvic examination. Another genital lesion that nearly always causes backache is prolapse of the uterus with cystocele and rectocele.

Backache from Extragenital Diseases

Backache from extragenital disease is of very frequent occurrence and must be given due consideration when determining the diagnostic significance of this common symptom. It may be situated in the lumbar region or the sacral region or the coccygeal region.

A. In Lumbar Region

Pain in the lumbar region may be caused by any one of the following extragenital conditions:

1. **Kidney or Ureteral Disease.**—The tenderness is in the kidney region posteriorly (Fig. 212). There is usually tenderness over the kidney laterally (Figs. 210, 211) and along the ureter, and also there are usually bladder symptoms.

2. **Muscular Rheumatism in Erector Spinae.**—The tenderness is well localized to the large muscle roll. The pain is usually most marked on attempted movement after a long rest, the back becoming gradually limbered up and less painful after the patient exercises a while.

3. **Neuralgia or Neuritis of Lumbar Nerves.**—The pain extends through the muscle region but the tenderness is localized along the course of the nerves. Usually some of the adjacent dorsal nerves are likewise affected, and often there is widespread hyperesthesia.

4. **Disease of the Spine** may affect the bodies of the vertebrae or the

posterior or lateral processes, and the tenderness will be situated accordingly. Arthritis in the spine is not so rare as formerly supposed, and x-ray examination should be employed for diagnosis in obscure cases of pain in this area.

5. **Distant Diseases.**—A retroperitoneal tumor may cause pain in the lumbar region, as may also various other affections leading to retroperitoneal irritation, for example, gastric and duodenal ulcer, pancreatic disease, liver disease, appendix and cecal affections, and sigmoid and perisigmoid inflammation or cancer.

6. **Functional Backache.**—This term is used loosely to indicate backache not due to a definite lesion. Such backaches are usually in the lower lumbar region, where the greatest functional strain comes, and are of three principal types, as follows:

a. Those due to muscular strain, from too long standing or too much stooping and bending, especially when the patient is anemic and in poor general health. This condition is seen frequently in hard-working mothers of large families, also in nurses, school teachers, and saleswomen.

b. Those due to hypersensitive condition of the nerves generally (hysteria, neurasthenia, neuralgia, neuritis). In these cases there are often other evidences of an unstable nervous system, such as pain in the back of the neck and between the shoulders, headaches, and a general tendency to erratic pains.

c. Static backache. Faulty posture is a very frequent cause of backache and one that should be considered in all obscure cases. Also, other related conditions such as flatfoot, improper shoes, improperly fitted corsets, lordosis, enteroptosis, etc.

B. In Sacral Region

Pain across the sacral region is a common accompaniment of genital lesions, as already noted. In addition, it may be caused by extragenital conditions as follows:

1. **Sacroiliac Joint Lesion.**—The causes of pain in the sacroiliac joint are (a) loose joint, usually from over-stretching of ligaments in labor, permitting undue movement in walking, and (b) arthritis, making every strain on the joint painful. The tenderness is localized to the sacroiliac joint of one or both sides (Fig. 32). Sometimes undue movement may be demonstrated. X-ray examination may aid in the diagnosis by showing abnormal separation of the surfaces or definite arthritic deposits. A point in diagnosis is that adjusting a corset very tightly about the hips gives relief in these cases by limiting the joint movement.

2. **Rectal Diseases.**—Hemorrhoids, proctitis, rectal stricture and rectal cancer may each cause backache in the sacral region, as may also perirectal affections, such as ischiorectal abscess or cellulitis.

3. **Bladder or Ureteral Diseases.**—Cystitis, ulceration in bladder, cancer or stone may cause sacral backache. Ureteral inflammation or stone is a frequently-overlooked cause of persistent backache and bladder irritability.

4. **Any inflammation or growth** involving the pelvic connective tissue or causing intrapelvic pressure may cause persistent sacral backache.

C. In Coccygeal Region

One of the most troublesome forms of backache is that involving the region of the coccyx at the very end of the spine. It is due to the following conditions:

1. **Coccygeal Inflammation or Neuralgia.**—The patient locates the pain very low, "at the very end of the spine," and the pain is usually noticed when sitting (pressure on hypersensitive tissues about the coccyx) and especially in the act of sitting down and rising (movement of affected structures by adjacent muscular action). The diagnosis is confirmed by examination of the coccyx bone when making digital examination of the rectum. With a finger in the rectum and the thumb outside (Fig. 151) the bone is grasped and palpated throughout, thus determining any deformity of the coccyx or any swelling or abnormal tenderness of the sacrococcygeal joint or of the coccyx itself or of the adjacent tissues.

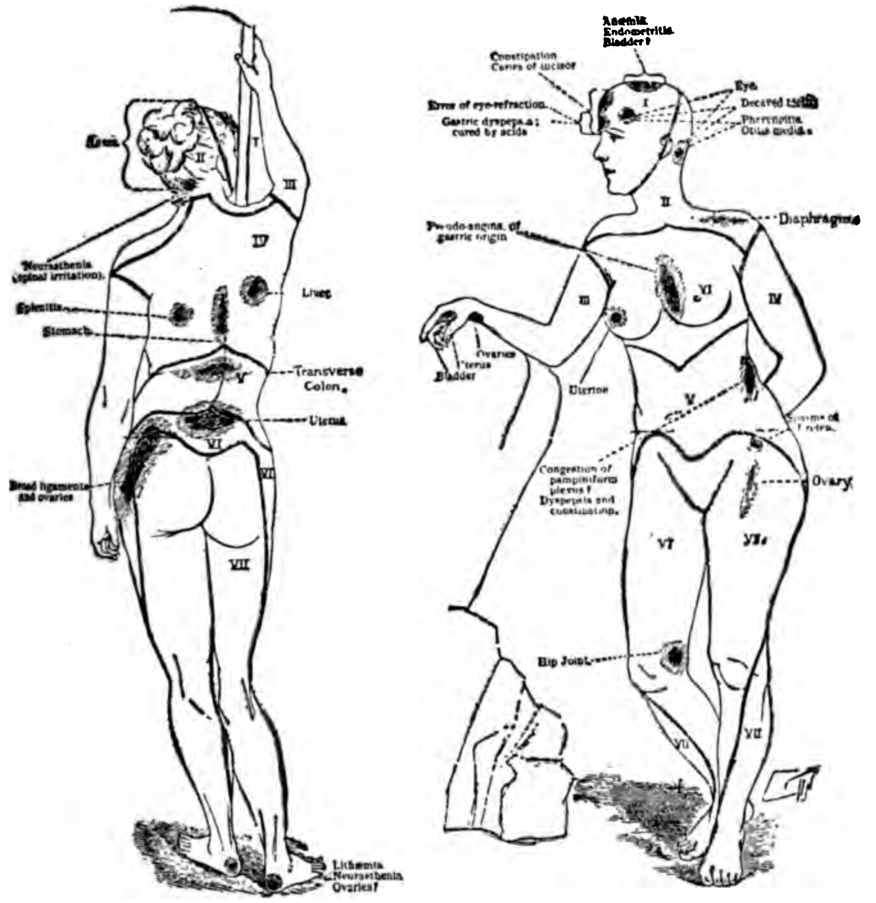


Fig. 223.—Showing the usual cause of reflex pains in the various regions. (Dana—*Textbook of Nervous Diseases.*)

2. **Perirectal Disease.**—Rectal diseases, leading to inflammatory infiltra-

tion or tumor infiltration of the perirectal connective tissue, may cause pain and tenderness in the coccygeal region.

REFLECTED PAINS

Reflected pains do not occupy so large a place in gynecologic symptomatology as formerly. We have come to look upon these distant pains in gynecologic cases usually as an indication of some intercurrent or complicating trouble at the site of the pain or of an abnormal condition of the nervous system, rather than as a direct reflex from the pelvic trouble. Careful investigation will show this to be the case in the great majority of instances of so-called reflex pains.

In rare cases, however, the connection between the distant pain and the pelvic lesion seems very close, as where, for example, a pain in the head or other situation is made to disappear by correction of a retrodisplacement of the uterus, only to reappear as soon as the uterus returns to its malposition.

When reflected pains do occur they are supposed to be distributed about as indicated in Fig. 223.

DISTURBANCES OF FUNCTION

The various disturbances of function (amenorrhea, menorrhagia, irregular menstruation, dysmenorrhea, dyspareunia, sterility) constitute important symptoms of disease in certain cases. They are considered in Chapter XIV, where the various causes, and consequently the diagnostic significance, of each are given. Those disturbances of function due to derangement of the ductless glands are considered in further detail in Chapter XV and the relations of disturbances in other organs to gynecologic diagnosis and treatment are considered in Chapter XVI.

CHAPTER III

GYNECOLOGIC TREATMENT

In gynecologic treatment the following therapeutic measures are employed:

Rest.

- Complete Rest, in bed.
- Partial Rest, from work.
- Sexual Rest.

Applications to Lower Abdomen and Exterior of Pelvis.

- MOIST HEAT.
  - Hot Stupes.
  - Hot Pastes.
  - Hot Poultices.
  - Hot Sitz-baths.
  - Hot Moist Pelvic Pack.

- DRY HEAT.
  - Hot Water Bag.
  - Japanese Stove.
  - Hot Water Coil.
  - Electrotherm.
  - Hot Air Chamber.
  - Hot Dry Pack.

- COLD APPLICATIONS.
  - Ice Bag.
  - Cold Coil.
  - Cold Sitz-bath.

- COUNTERIRRITANT APPLICATIONS.
  - Mustard (poultice, plaster).
  - Cantharides (plaster, collodion).
  - Tinct. Iodine.

Applications to External Genitals, Vagina and Cervix.

- Douches.
- Concentrated Solutions.
- Powders.
- Tablets.

- Ointments.
- Vaginal Suppositories.
- Tampons.
- Tampon-capsules.
- Pessaries.
- Cautery.

Intrauterine Treatment.

- Medicated Applications within uterus.
- Irrigation.
- Curettage.
- Cauterization.
- Cervical Dilatation.
- Vacuum Treatment.

Applications to Lower Abdomen and Interior of Pelvis.

- Pelvic Massage.
- Pressure Treatment.

Applications to Body Generally.

- Bathing.
- Friction Rubbing (with alcohol, salt, brush, etc.).
- General Massage.
- Dress Corrections.

Postural Methods and Exercise.

- Knee-Chest Posture.
- Trendelenburg Posture.
- General Exercise.
- Special Exercise.

Internal Treatment.

- Medicines.
- Diet.
- Psychotherapy.

Radium.
X-Ray.
Operations.

REST

Complete Rest in bed is necessary when acute **inflammation is present** and in acute exacerbations of chronic inflammation.

In an acute attack of vaginitis, endometritis, **salpingitis or acute pelvic** peritonitis, the patient should be put to **bed and kept there until the pain and** fever subside. When the inflammation is severe and accompanied by much pain, the patient should use the bed-pan and should not be permitted to get up to a vessel beside the bed. Also, rest in bed for a few days will temporarily diminish the pain of chronic inflammation and the backache and distress that accompany loss of support in the pelvic floor.

It is a rule, with but few exceptions, that in pelvic disease strict rest in bed, combined with laxatives and hot vaginal douches and hot applications to lower abdomen, will in twenty-four to forty-eight hours relieve the pain to such an extent that the patient is comfortable.

The exceptions to this rule are:

Active spreading inflammation of the peritoneum.
A collection of pus with tension.
Recurrent hemorrhage, as in tubal pregnancy.
Threatened abortion.
A tumor compressing pelvic nerves.
Neuritis and neuralgia.

In these conditions the pain may be persistent and severe in spite of absolute rest. By keeping these things in mind, the effect of rest becomes a help in differential diagnosis in certain cases.

Partial Rest is advisable in many cases that do not require complete rest in bed. The work of some patients, requiring as it does much walking or long standing or constant running of the sewing machine or lifting of children, tends to aggravate and prolong certain pelvic affections and for that reason it may be necessary to have the patient stop work for a while, even though she can ill afford financially to do so. Again, it may be advisable to direct a vacation to some distant point for the patient who is dragged down by household duties or the care of children or office work or the exactions of society. The rest from care, the change of environment, the direction of the thoughts and activities into new channels, will in some cases do more than anything else toward restoring the patient to health. Directions should of course be given for whatever additional therapeutic measures are necessary during the visit.

Sexual Rest is necessary in many cases, particularly in inflammatory troubles. In some cases coitus must be absolutely forbidden and in other cases restricted, as the marked congestion accompanying it is likely to aggravate the trouble.

In acute inflammation it is rarely necessary to say anything on this point, as the painfulness of coitus itself prevents it. In subacute inflammations, however, and in chronic conditions aggravated by pelvic congestion, when the trouble resists treatment and it seems probable that coitus is interfering with the cure, it is advisable to stop sexual intercourse or restrict it. This may be accomplished by one of three ways, as follows:

a. Instructing the patient or her husband regarding it. This is somewhat embarrassing and not very effective, though it is sometimes the best plan.

b. Use of vaginal tampons, the tampons to be worn continuously and changed only in the office. In this way the beneficial effect of tampons is secured and at the same time coitus is restricted. The tampon-capsules when indicated for other purposes, may be used so as to accomplish this object also—the patient being directed, on removing each tampon, to take a douche and immediately introduce the next one.

c. Sending patient on a trip away from home. Here also the sexual rest is only incidental, though quite important in conditions aggravated by pelvic congestion.

APPLICATIONS TO THE LOWER ABDOMEN AND EXTERIOR OF PELVIS

These applications are used to relieve pain and limit inflammation.

MOIST HEAT

Hot stupes are made by folding a piece of flannel several times, making a pad large enough to cover the lower abdomen. This pad is wrung out of very hot water and quickly applied to the abdomen and covered with a piece of thin oilcloth or a heavy towel. The thin oilcloth is preferable, as it keeps in the heat and moisture better and is not so heavy. As soon as the pad begins to cool, another one is wrung from the hot water and slipped in place as the first is removed. If the stupes are changed frequently and thus kept hot, they are very effective in relieving pelvic pain.

They have some effect in all painful conditions, but the most marked effect is seen in the pain of inflammation. The efficiency of the hot stupes may be increased by adding one or two tablespoonfuls of turpentine to the hot water in the basin. To some patients, however, the odor of turpentine is disagreeable and disturbs the stomach and with such it should not be used. The disadvantages of hot stupes are that they have to be changed very frequently and that they soon get the bedclothing damp.

Hot Pastes.—There is a material for external use, consisting of an earthy silicate for a base and having incorporated glycerin and mild antiseptics with a pleasant odor. This is very convenient for application to the lower abdomen for it holds the heat and moisture well. This material, with slight variations, is put up by a number of firms and given different names (glykaòlin, antiphlogistin, etc.). Under one of the trade names, it may be purchased at any drug store in one or two pound cans. The method of its application is as follows: Take off the lid and set the can in a pan of hot water on the stove until the paste is thoroughly heated. It is then thin enough to spread easily with a spatula or knife or spoon handle. It is spread directly on the skin in a thick layer (about one-half inch thick). The whole lower abdomen is covered with a thick layer of the hot paste, which is covered with a piece of flannel and outside of this is placed the hot-water bag or Japanese stove to keep it warm. The paste sticks tight to the skin at first, but after twenty-four hours usually there has been sufficient perspiration beneath it to loosen it and cause it to come off easily. It is then removed and a fresh layer applied immediately. A fresh application is made every twenty-four hours, as long as hot applications are desired.

Flaxseed Poultice retains the heat well and is much used as a home remedy when hot applications are desired. It is not nearly so convenient or cleanly as the hot pastes but is about as efficient if changed often and kept up for several days, and is often at hand when the other things are not available. The flaxseed poultice is made as follows: Take two parts of ground flaxseed (flaxseed meal) and five parts of boiling water and mix with constant stirring. When mixed, spread thick (one-half inch) on a piece of thin muslin or cheese-cloth. Have the cloth large enough so that you can leave a margin on each side to fold over. The poultice should cover one-half the cloth and the other half can then be laid over after the margins are turned in. If a hot-water bag or Japanese stove is at hand put that over the poultice to keep it hot.

Hot Sitz-bath.—The patient sits in a small tub, preferably of special design, containing water enough to cover the hips, genitals and lower abdomen. The water should be as hot as the patient can stand without discomfort (105° to 115°). She should remain in the sitz-bath from twenty to thirty minutes and then be dried and put in bed. It may be repeated daily or several times daily, as found most beneficial. The hot sitz-bath is sedative in effect and relieves very much the pain of pelvic inflammation. In inflammation it should be used only in those cases where the patient may make the necessary movements without detriment. It is useful also in helping the onset of the menses in amenorrhea or suppressed menses.

Hot Moist Pelvic Pack.—Instead of making the hot applications to the lower abdomen only, they may be extended all around the pelvis. The whole pelvis is encased in the hot stupe or compress, and over all a large piece of thin rubber cloth or table oilcloth is placed. A woolen blanket also is wrapped around the patient to keep in the heat and moisture. This may give much relief from the suffering in acute suppression of menses, in acute pelvic inflammation and in severe pelvic neuralgia.

DRY HEAT

Hot-Water Bag.—The hot-water bag produces almost the same effect as the hot stupes, and keeps hot a longer time without change and is much more convenient to manipulate. If the effect of moist heat is desired, a hot stupe may be applied and a hot-water bag placed over it to keep it warm. If no hot-water bag is at hand, a large flat bottle filled with hot water may be used. This should be securely corked and wrapped in a thick flannel cloth. If no suitable bottle is available, a plate, heated and wrapped in a flannel cloth, may be used, or a stove-lid or other article that will retain the heat.

Japanese Stove.—This consists of a small flat metal container, about the size of the hand, in which is burned a compressed powder resembling charcoal. This little container may be purchased at the drug store for a few cents and is very convenient for applying dry heat or for keeping a moist application warm. If it is wished very hot, two or three sticks, instead of one, of the powder may be lighted and dropped in. If one stove is not large enough, two or three may be used.

Hot-Water Coil.—This consists of a coil of rubber tubing and a boiler, the former being attached to the latter by tubing in such a way as to cause a constant circulation of hot water through the coil. It is very nice but rather expensive.

Electrotherm.—This electric heating pad is heated by a current through a cord, which is to be attached in the ordinary electric light socket. This, like the other dry heat appliances, may be used alone for dry heat or over a moist application for moist heat.

Hot-Air Chamber.—The apparatus is the same as that for applying hot dry heat to the joints or other parts of the body, the chamber for gynecologic cases being made to fit about the pelvis and lower abdomen. The temperature that will be borne varies with individuals and also with the length of the time employed. The air chamber may be heated with electric lights instead of in the ordinary way. This is a convenient way and one in which the heat is easily regulated.

The effect of the hot-air chamber is to cause marked redness of the skin, free perspiration and a hastening of the absorption of pelvic exudate. Cases of chronic pelvic inflammation are the ones suitable for the treatment, and the details of its application and effects are taken up under that subject (Chapter X).

Hot Dry Pack.—Dry heat may be applied all around the pelvis by packing around it hot water bags or hot bottles or other containers for maintaining the heat, the skin being well protected by layers of flannel.

COLD APPLICATIONS

In some cases cold gives more relief than heat, though the cases in which it will do so cannot be certainly determined without trial. It has been stated that cold gives more relief when the pain is due to active inflammation and the hot applications in other cases. In the author's experience, that rule does not hold good. On the other hand, in the majority of cases, pelvic pain, inflammatory or otherwise, is relieved more by hot applications than by cold. Consequently, the author's rule is to use hot applications first and, if they fail to give relief, then the cold.

There are several ways of applying cold. To get the best sedative effects it must, like the heat, be maintained continuously, or almost continuously, for several days.

Ice Bag.—The ordinary ice bag is a convenient and satisfactory method of applying cold. If no regular ice bag can be secured, the ice may be put in a hot-water bag. The ordinary hot-water bag filled with ice does fairly well as a substitute for an ice bag but it is not as convenient, for the ice has to be broken into very small pieces. If no rubber bag of any kind is at hand, the broken ice may be wrapped in a towel and placed in a piece of oilcloth, the edges and corners being pinned up so that no water can leak out.

Cold-Water Coil.—One end of the coil is attached to a vessel of ice water so that the water runs through it slowly and keeps it cold. The other end conducts the water from the coil to a waste bucket beside the bed. If the hydrant water is cold enough, the tube leading to the coil may be attached to the hydrant.

Cool Sitz-bath.—This is used, not as a sedative but as an active stimulant to the pelvic organs. It is taken the same as the hot sitz-baths except that the temperature of the water is 70° to 50°, and the patient does not stay in so long—only five to twenty minutes. It may be given gradually, i.e., the water is tepid at first and gradually cooled to 60° or 50°. In some cases of amenorrhea the cool sitz-baths may prove more beneficial than the hot. They should, however, be given cautiously and in strong individuals only and should not be continued unless good reaction comes on. As in a cool general bath, the reaction should be encouraged and increased by prompt drying and brisk rubbing.

COUNTERIRRITANT APPLICATIONS

Mustard Plaster.—A mustard plaster or mustard poultice is applied over the lower abdomen just long enough to produce marked redness of the skin. It should not be left on long enough to blister. This gives a quick and widespread counterirritation of the skin and assists materially in relieving acute deep-seated pain. The effect is transitory, however, and needs to be continued by the ordinary hot applications. If there is smarting of the skin after removal of the mustard, apply a layer of vaseline and a thin cloth under the hot applications. The addition of turpentine to plain hot stupes is a form of counterirritation, and in some cases assists very much in relieving pain. Of course, this should not be applied to the abdomen in a case where an abdominal operation may be necessary soon.

Cantharides Plaster.—Small fly blisters over areas of persistent pain often do much good in cases of chronic pelvic inflammation without marked lesion and in cases of pelvic neuralgia. The blister should be small, from the size of a quarter to that of a dollar, and should be carefully protected from infection until healed.

Cantharides Collodion is very convenient for making the small fly blisters. Paint it over the area which it is desired to blister and repeat after twenty-four hours if no blister has appeared.

Tincture of Iodine is painted over the ovarian region of the affected side once or twice daily until the skin becomes tender. Then it is stopped for a few days until the tenderness subsides somewhat, when it is renewed. By varying the application as indicated by its effect on the skin, a constant mild counterirritation may be kept for weeks, often with decided diminution of pain.

APPLICATIONS TO EXTERNAL GENITALS, VAGINA AND CERVIX

VAGINAL DOUCHES

The vaginal douche is used for several purposes—for simple cleansing, for astringent effect, for antiseptic effect, for reducing by periodicity and for the specific effect of hot water.

Cleansing Douche.—The simple cleansing douche may be used when there is an increase in the normal mucoepithelial discharge or when there is a mucopurulent discharge without pain or evidence of inflammation or marked relaxation of the tissues.

Plain boiled water, comfortably warm (100° to 105°), may be used, or if preferred a teaspoonful of ordinary table salt may be added. The simple cleansing douche may be taken with the fountain syringe or with the bulb (Davidson) syringe. It may be taken with the patient lying in bed or in a sitting posture over a vessel. In all vaginal douches the point of the syringe nozzle should be so large that it cannot enter the cervical canal. Serious disturbance and even death has followed the accidental injection of the douche solution into the uterus. The point of the nozzle should be three-fourths inch in diameter, with the end closed and the openings at the sides. When it is necessary to use a slender nozzle (as in giving a douche to a virgin) it should be very short.

Vaginal douches should be used only when there is some definite indications for them. In healthy women the constant use of douches or the routine use of them for indefinite periods, is not advisable. They are not required for mere cleanliness, in fact, they interfere in a measure with the normal germicidal vaginal contents, which nature has provided to keep the vagina in a healthy condition and to protect the structures above.

Astringent Douche.—The astringent douche is used when the vaginal walls are lax and atonic or in the various erosions and other chronic inflammatory lesions of the cervix and in cases where there is soft, bleeding tissue about the cervix or vagina.

As a mild astringent and sedative douche, aluminium acetate, a teaspoonful to two quarts of water, is exceptionally efficient. Dissolve the powder in hot water, and then cool it sufficiently to be comfortable for the douche. The object is to make a saturated solution and no harm results if some remains undissolved. When a stronger astringent effect is desired, the zinc and alum douche may be used. The patient is given a prescription for fifteen or twenty powders, each containing 20 gr. of zinc sulphate and 60 gr. of alum. One powder is to be dissolved in two quarts or one quart of water, depending on the strength of solution required. Care must be exercised that the solution does not irritate the vaginal wall. It is well to begin with the weak solution and advance to the stronger as toleration is established.

Astringent douches should be taken with the patient in the horizontal posture, preferably with the hips elevated on the bed pan, as indicated in Fig. 224.

Antiseptic Douche.—The antiseptic douche is used in those cases of purulent discharge or mucopurulent discharge in which the admixture of pus is so prominent that an active germicidal effect is important. A very satisfactory antiseptic douche is made by adding a teaspoonful of lysol to two quarts of warm water. In some cases a potassium permanganate douche (1-5000 solution) is more satisfactory. Another efficient antiseptic for the douche is formol (1-5000 to 1-3000 solution). Formol as purchased in the drug stores is a 40 per cent solution of formaldehyde gas. Formol is a very strong antiseptic and must be used in weak solution to avoid irritation. Fifteen to twenty drops to two quarts of warm water is usually sufficient.

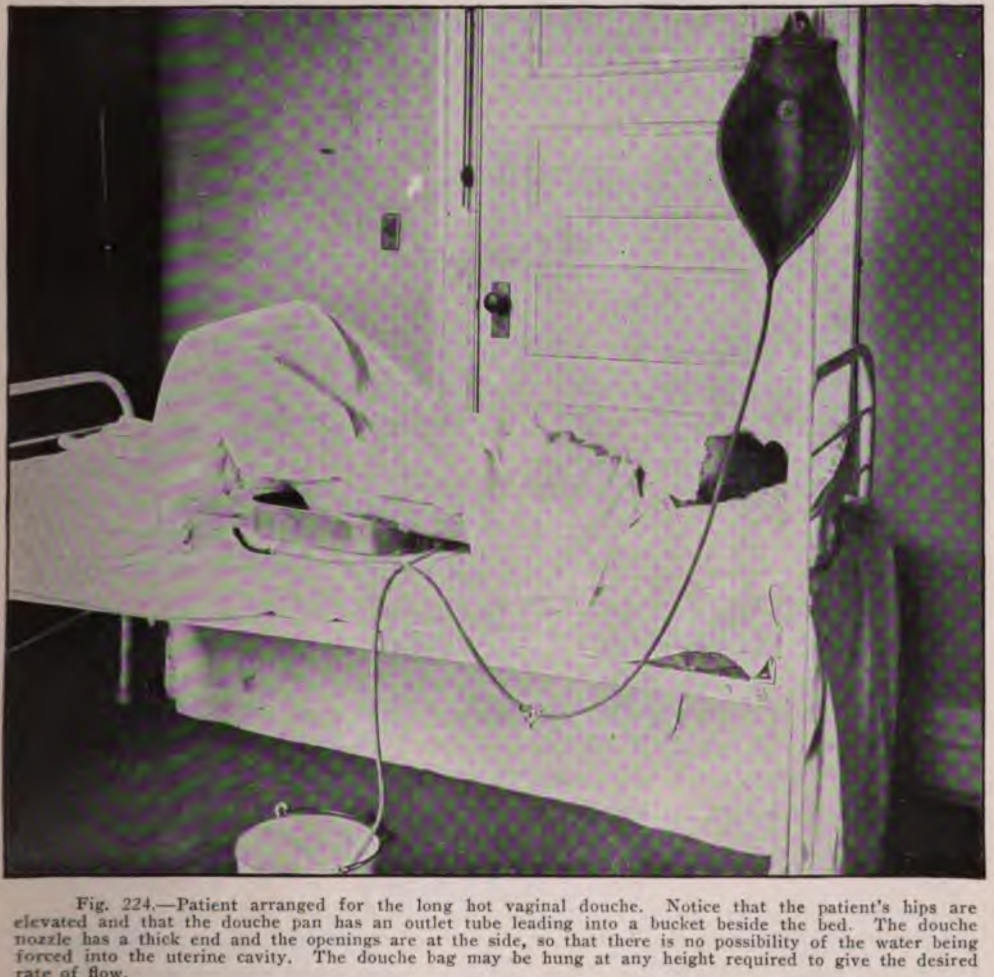


Fig. 224.—Patient arranged for the long hot vaginal douche. Notice that the patient's hips are elevated and that the douche pan has an outlet tube leading into a bucket beside the bed. The douche nozzle has a thick end and the openings are at the side, so that there is no possibility of the water being forced into the uterine cavity. The douche bag may be hung at any height required to give the desired rate of flow.

Mercury bichloride was formerly often prescribed for an antiseptic douche. But the concentrated solution, for making the douche, is dangerous when standing about in the medicine cupboard of the home. So many fatal cases of accidental poisoning from bichloride solution or tablets have occurred that it is not advisable to prescribe the drug for home use. The same may be said of carbolic acid which, though a deadly poison, is easily mistaken for cough syrup or other remedy, the mistake not being apparent until too late.

Long Hot Douche.—The long hot douche is cleansing and may be made either antiseptic or astringent, but its special and distinct effects are the relief of pain, the limitation of inflammation, the hastening of absorption of exudates and the toning up of relaxed tissues. These effects are brought about by the prolonged application of hot water to the vaginal walls and cervix. The specific effect of the hot douche was recognized more than forty years ago by that excellent clinical investigator, Dr. T. A. Emmet, and clearly set forth in his splendid work published in 1879.

To get the best effect, it is essential that particular attention be given to certain details of its administration. These details are usually carried out in an incomplete way, for the importance of their full employment is not at all appreciated by the patient and as a rule only partially by the physician. Hence, too often the hot douche amounts to little more than a cleansing douche, the specific effect of the heat being wholly missed. The following are the main points in regard to the long hot douche:

a. The patient should be lying down with hips elevated on the douche pan (Fig. 224). This causes the hot water to run well up about the cervix and vaginal vault where most needed.

b. The water should be as hot as the patient can take comfortably. Starting with warm water, hotter water should be added as the tissues become accustomed to the heat, but it should not be made so hot as to cause discomfort.

c. The douche should be of long duration (20 to 30 minutes). This prolongation of the douche is secured by using a large amount of water (2 to 4 gallons) and giving it slowly, just fast enough to prevent cooling of the water.

d. The patient should lie quietly in bed afterward, as walking or sitting interferes with the desired effect. The long hot douche is used principally in painful inflammatory troubles that confine the patient to bed. If used in chronic conditions it should be taken at bedtime, or if at any other time, the patient should remain in bed for at least an hour or two afterward.

e. If an astringent or antiseptic effect also is desired, the required medicine may be added to the last half gallon of water.

LOCAL TREATMENT

Before taking up the details of the office treatment of gynecologic diseases, it would be well to get a clear idea of what **good** can be accomplished and what **harm** may be done by such treatment.

The importance of ordinary office treatment is, on the whole, still rated much above its actual value. This statement applies especially to the application of medicines to the vaginal walls, to the cervix and to the interior of the uterus. In some affections for which this method of treatment is generally and persistently employed, it does no good and much harm.

There is, however, no warrant for those wholesale condemnatory statements made from time to time which, reduced to their essence, mean that when any pelvic disturbance is severe enough to require treatment it requires operation. Such teaching is very far from the truth and is almost, if not fully, as erroneous in theory and deplorable in results as the former teaching that "local treatment" was the most important measure in the handling of patients with pelvic disease. Happily the treatment of gynecologic diseases is no longer based upon obscure theories and opinions empirically expressed, but upon the rational application of known remedies to demonstrated pathologic conditions. Though there is still much to be learned and much that is obscure, as there always will be about a subject so intimately connected with the mysterious processes of life, the essential features of most of the diseases and the main effects of the principal methods of treatment are open to the understanding of all who will give the necessary time and study to the subject.

Critically reviewing the demonstrated pathologic changes present in the various gynecologic affections, it is evident that in a considerable proportion of the serious diseases, effective treatment is necessarily operative, for the abnormal changes are of such nature that they can be influenced only by direct handling and treatment of the affected organs. On the other hand, there are many conditions that may be much influenced by nonoperative measures carried out at home, such as attention to general health, internal medicine, special exercises, posture, hot or cold external applications, hot vaginal douches, etc. Much effect is exercised also over certain conditions, by local treatment in the office—pessaries, tampons, packings, pressure treatment, massage, dilatation and various medicinal applications to the vagina or cervix.

No method should be accepted for general use until sufficient knowledge has been obtained to show what the principal effects of that method are and in what conditions we may reasonably expect decided benefit from such effects.

The method just now under consideration is the application of concentrated solutions to the cervix uteri, the vaginal wall or the external genitals.

What good can such applications do?

1. They may exercise an antiseptic or an astringent or an anesthetic or an irritating effect, limited to the surface on which they are applied.

2. They may destroy tissue (cautery).

3. They may draw off fluid from tissues adjacent to the vaginal vault (hygroscopic effect), as in the use of glycerin in various combinations. This may diminish the pain (interstitial pressure) of an inflammatory or edematous infiltration and possibly assist nature in limiting the inflammation and hastening absorption. This effect is very desirable, but in acute and subacute cases its beneficial effect is more than overbalanced by the trips to the office. In such cases the effect may be more advantageously secured by having the tampon-capsules used at home, immediately after the douche. Occasionally in the case of a chronic exudate, when the patient can get about without disturbance, it may be used with decided effect in office work.

4. They may possibly influence deep pains by counterirritation at the vaginal vault. This is applicable only in cases of chronic exudate or pelvic neuralgia, and even in these it is of doubtful utility. Whether the decided relief of pain that sometimes follows counterirritation at the vaginal vault is due to the mechanical drawing of the blood from the adjacent tissues to the dilated vessels of the vaginal surface, or to a reflex deep anemia from the irritation of surface nerve-filaments, or to a purely sensory effect on the deeper nerves by irritation of the corresponding superficial nerves, the author is not prepared to say. Possibly it is not due to any of these but to some other factor in the treatment (pressure, cleansing, posture).

Formerly much importance was attached to counterirritation at the vaginal vault, and a woman with pelvic inflammation could hardly be considered initiated into treatment until the vaginal vault and cervix had been painted with Churchill's tincture of iodine. It is not so often used now, for we have more effective measures.

What harm can such applications do?

1. May cause the patient to come to the office when the dressing and coming do more harm than the application does good. This is true of all acute inflammations (even vaginal and vulvar) and of practically all subacute inflammations of the uterus and deep pelvic structures.

2. May cause postponement of effective treatment, by holding out false hope, until the disease is much more difficult of cure or is past cure. This applies to chronic inflammations of the corpus uteri and adnexa, to deep-seated inflammatory troubles of the cervix uteri and to beginning cancer of the uterus.

3. May convert a neurasthenic or hysteric into a confirmed invalid by fixing attention upon, and exaggerating the importance of, some trivial local disturbance. In such patients the frequent calling of the attention to some minor disturbance in any part of the body is deleterious and particularly so if the disturbance is in the genital tract, for the importance of minor disturbances there is greatly overrated in the minds of people generally. For this reason, in patients with neurasthenic or hysteric tendency, it is advisable to avoid repeated local treatments, even in some conditions where otherwise one would feel that they might be beneficial. Occasionally local treatment of an unimportant lesion two or three times, principally for psychic effect and to gain the patient's confidence by letting her see that you appreciate all that is there, is beneficial. Usually, however, the same effect is better accomplished by a thorough examination and then an unequivocal dismissal of those organs from the list of damaged structures.

Solutions Used

The concentrated solutions used for application to the vaginal walls or cervix, are applied through a speculum by means of a pledget of cotton held with a uterine dressing forceps, or by means of a cotton-wrapped applicator. These solutions may be divided into several groups, according to effects. The author does not give all the solutions under each group but only some well-known examples.

1. **Antiseptic and Astringent Solutions.**
   Protargol Sol. 2 per cent to 10 per cent.
   Argyrol Sol. 20 per cent to 40 per cent.
   Silver Nitrate Sol. 2 per cent to 10 per cent.
   Bichloride Sol. 1 to 500.
   Tinct. Iodine.
   Copper Sulphate Sol. 10 per cent.
   Adrenalin Chloride Sol. 1-1000.
   Liq. Ferri Subsulphatis.
   Acetone.

Silver nitrate solution is the one formerly most commonly used as an antiseptic application to the genital tract. It is still used largely and with excellent effect, though there are some other preparations with the same effect and without the pain on application and the discoloration of the clothing incident to the use of silver nitrate. Silver nitrate is the pioneer of the silver preparations. It is used in the treatment of vulvitis, vaginitis, erosion and ulcer about cervix, endocervicitis and endometritis. The strength used for vulva and vagina is usually 2 per cent to 4 per cent, the weaker being used at first when the parts are particularly sensitive and the stronger later as the sensitiveness becomes less. A sensitive inflamed surface or an abrasion or ulcer is usually much diminished in sensitiveness after one or two applications, and the application seems also to stimulate repair. For application to an eroded area or an ulcer on the cervix, 4 per cent to 10 per cent is used to stimulate repair.

During the last few years a number of silver preparations have been put forward as superior to silver nitrate for local application. Protargol and argyrol are two that have stood the test for extensive use. They have about the same effect as silver nitrate, do not irritate so much and do not form permanent stains on the clothing and skin. The protargol is used in the same strength as silver nitrate. The argyrol must be used much stronger, 20 per cent to 40 per cent. It is the least irritating of the silver preparations, when in fresh solution.

The bichloride solution is strongly antiseptic and mildly astringent.

Tincture of iodine (either the ordinary tincture or Churchill's tincture) is a useful antiseptic and stimulant to chronically inflamed areas or to erosions or ulcers. It may be used as a counterirritant application to the vaginal vault in chronic pelvic inflammation.

The copper sulphate solution is used to check bleeding and to stimulate healthy cell action in eroded and ulcerated areas. It has a tendency to check bleeding from all ulcers except those due to beginning malignant disease. Consequently it is helpful in the differential diagnosis of a malignant ulcer, as explained in Chapter IX.

Liq. ferri subsulphatis may be used when a strong hemostatic application is needed for a bleeding area.

Adrenalin is used for its well-known hemostatic effect, for example, to a bleeding spot where a polyp has been removed.

Acetone is employed for hardening and drying soft bleeding tissue. It is employed principally in inoperable carcinoma of the cervix uteri, and the details of its application, together with indications and contraindications, are given in Chapter IX.

2. **Cauterizing Solutions.**

Carbolic Acid 95 per cent.
Iodized Phenol.
Nitric Acid.

Carbolic acid is employed as a cauterant application to unhealthy ulcers on the cervix or vaginal wall, particularly chancroidal ulcers.

Iodized-phenol (half tr. iodine) is a milder cauterant, more superficial and less irritating than carbolic acid and also less effective. Nitric acid is a very deep and painful cauterant. It is now seldom used, as carbolic acid is effective and is easier handled and causes less subsequent disturbance.

3. **Hygroscopic Solutions.**

Glycerin.
Boro-glycerin (Boric acid 50 per cent).
Carbol-glycerin (Carbolic acid 2 per cent).
Ichthyol-glycerin (Ichthyol 10 per cent).
Protargol-glycerin (Protargol 10 per cent).
Tannic-acid-glycerin (Tannic acid 10 per cent).

The glycerin preparations are used for the hygroscopic (water-extracting) effect of the glycerin and also for the special effect of the particular drug incorporated with the glycerin. The application is made by soaking one end of a tampon in the desired glycerin preparation and then introducing it through the speculum into the upper part of the vagina, the medicated end being placed against the cervix. These glycerin tampons are used particularly in acute and chronic inflammatory conditions in the pelvis. They seem to assist materially in diminishing the pain and soreness and they certainly exercise a decided effect on the adjacent tissue fluids, for the patients often remark on the large amount of water which comes from the vagina when using these glycerin tampons.

4. **Anesthetic and Antipruritic Solutions.**

Cocaine Sol. 10 per cent.
Novocain Sol. ½ per cent (for hypodermic injection).

The 10 per cent cocaine solution is used for local application to sores or abrasions, to diminish pain during examination or for cauterization.

The ½ per cent cocaine solution is used as a subcutaneous or submucous injection, for removing small growths or pieces of tissue for microscopic examination.

The antipruritic solutions are used principally in pruritus vulvae and they are taken up in detail in Chapter IV.

POWDERS

Powders may be applied by means of the powder blower or they may be placed on a cotton or gauze tampon, which is then placed in the upper part of the vagina. Powders innumerable have been used for this purpose, and as a rule any powder that is a good antiseptic application for wounds is good also as a vaginal application.

Powders are used principally for the antiseptic and drying effect or for an anesthetic effect.

1. **Antiseptic and Drying.**
    - Pulv. Boric Acid.
    - Xeroform and Boric Acid (1 to 4).
    - Bismuth Subnitrate.
    - Yeast.
    - Aristol.

Pulverized boric acid is used as a mild antiseptic and drying powder. It is bland and can hardly cause irritation even with children. Xeroform and boric acid (1 to 4) is preferable when a stronger antiseptic powder is desired, in fact, it is the powder the author ordinarily uses, except when some special astringent or anesthetic effect is desired. Xeroform has proved a very satisfactory substitute for iodoform. Its action in stimulating healthy granulation, is very much like iodoform and it has practically no odor. It is about as effective as the other iodoform substitutes and less expensive.

Dried yeast mixed with bolus alba has been highly recommended as a vaginal application in cases of leucorrhea, with the idea that the yeast fungus inhibits the growth of other bacteria. It is useful in certain unusual and resistant forms of vaginal inflammation and is considered in detail under vaginitis (Chapter IV).

2. **Anesthetic Powders.**
    - Orthoform, Xeroform and Boric Acid (1-1-4).
    - Chloretone, Xeroform and Boric Acid (1-1-4).

Orthoform is a powder that is decidedly anesthetic and for that reason is advantageously combined with powders used in the treatment of painful affections of external genitals, vagina and cervix. The anesthetic effect is, of course, most marked when the powder is used pure, but, like cocaine, it has a devitalizing effect on poorly nourished tissues and may cause superficial sloughing if used too strong. The author has had such an experience with it in treating superficial abrasions due to senile pruritus vulvae—the orthoform, when dusted on pure, causing the abrasions to become very extensive instead of smaller. A similar experience, in a patient past the menopause, was related to him by one of his colleagues.

Chloretone can be used to advantage whenever there is pruritus or a sense of soreness in the vagina or about the external genitals. It is very satisfactory as a dusting powder to painful ulcers, chancroidal and otherwise. As a dusting powder, it is diluted with a bland powder and combined with an antiseptic powder as above indicated.

TABLETS

Compressed tablets containing antiseptic or astringent or anesthetic drugs, are put up for vaginal use. They may be introduced to the upper part of the vagina by the patient, either following a douche or without a douche, once or twice daily or more often as directed by the physician.

Tablets of various formulae for vaginal use may be obtained. They are very convenient in cases where it is desirable to have the patient use some drug between the office treatments or where the patient cannot come to the physician or be seen by him often enough for regular treatment. They are not as effective, however, as powder applications made with speculum exposure of the affected area and held in place by a tampon, as in office treatment. In prescribing tablets use only those put up by a reliable house, so that you can depend on the stated formula and know just what you are using.

The effect of these tablets, dissolved in the vagina, as of other vaginal medication, is of course only local (limited to superficial effect on the vagina and cervix) and has practically no influence on deep-seated or serious vaginal or uterine or periuterine lesions. Tablets of various shapes and alleged formulae and called by fancy names, are put up for vaginal use by patent medicine venders and peddled from house to house by women agents. They are put forth as wonderful discoveries that will cure all "female diseases," and like other alleged "wonderful discoveries" they deceive many a poor woman with unfounded hopes, the falseness of which in serious diseases she often discovers only when the disease is past cure. It is another case of "blind leading the blind" or, worse still, of avarice leading the blind.

OINTMENTS

Various ointments are used to allay irritation about the external genitals and the details of their use are given in Chapter IV under vulvitis and pruritus vulvae.

VAGINAL SUPPOSITORIES AND CONES

Vaginal suppositories furnish another method of applying medicine to the vaginal wall and cervix.

In vaginal suppositories, the active ingredient is incorporated with coca butter or other suitable material which melts in the vagina. Vaginal suppositories are used principally in the treatment of chronic vaginitis in children, in cases in which it is difficult or impracticable to employ the ordinary and more effective methods of vaginal treatment.

TAMPONS

A vaginal tampon is simply a piece of absorbent cotton or common cotton or wool or gauze, of the desired size and shape, with a short string attached, so that the tampon may be removed from the vagina by the patient after a specified time.

One way to make a cotton tampon is to take a rather thick piece of cotton (common cotton or absorbent cotton) of the required length and width and thickness and tie one end of a strong string firmly about the middle. Fold the cotton at the place where the string is tied. This brings the free ends together. If it is desired to use a solution, the free ends are dipped in it. If it is desired to use powder, the free ends are spread out so as to make a depression in which the powder is placed. This end of the tampon is then caught with the long uterine dressing forceps and carried up to the cervix.

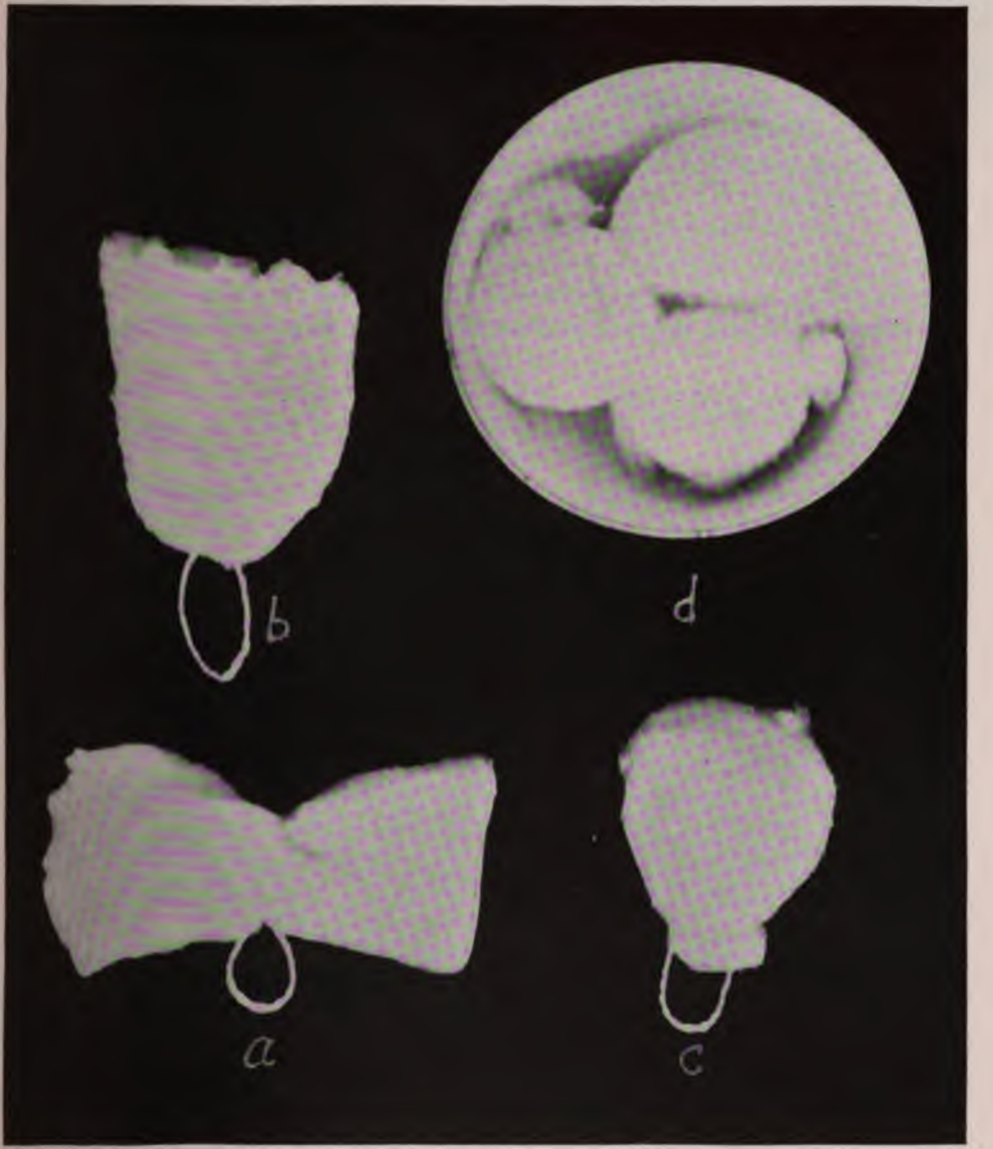
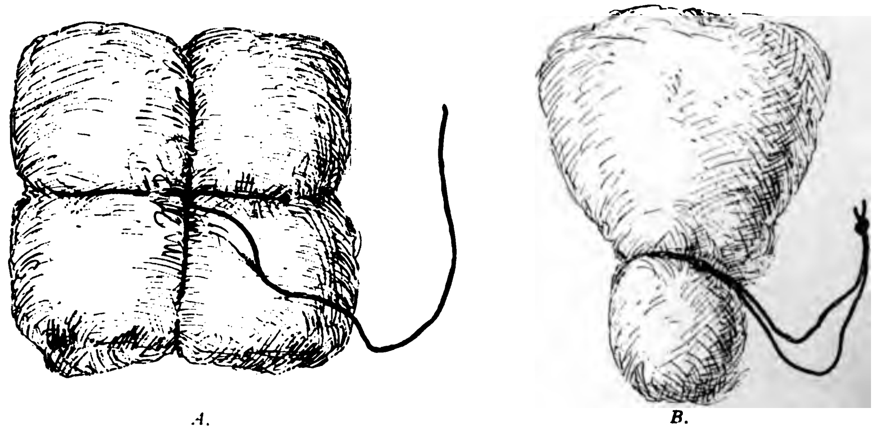


Fig. 225.—Preparation of Tampons. *a.* A piece of cotton of the required size with a strong string tied about the middle and also a loop tied. *b.* The same, with the ends folded up preparatory to receiving powder in the hollow formed there or to being dipped into an application-solution. *c.* Another satisfactory way of making a tampon. The piece of cotton is folded and the ends are tied together and the string looped. *d.* A small bowl containing tampons ready for use.

Leave the string long enough so that the end will project from the vagina, that the patient may easily catch it and remove the tampon at the end of twelve to twenty-four hours as directed. It is well to make the string into a loop as indicated in Fig. 225. Tampons made of surgical wool are preferable when the principal effect desired is support, as they are much more elastic than the cotton and retain their elasticity longer. In some cases the wool proves to be irritating to the vaginal walls. To prevent this and yet secure the springiness imparted by the wool, the wool tampon may be covered with a thin layer of common cotton. The Schultze tampon for catching and estimating the amount of discharge from cervix or upper vagina is shown in Fig. 226.

It is a good plan to keep prepared, ready for use, a number of tampons of different sizes. They may be prepared during leisure and they are then ready when needed, and thus is saved considerable time and inconvenience.

When the vagina is tamponed with a strip of gauze or with cotton balls without strings, it is referred to as a vaginal tamponade. The **author has** included all these packings under the general term "tampons."



A. *B.*

Fig. 226.—*A*, Schultze tampon; *B*, Ordinary tampon.

Tampons of cotton or wool or gauze or vaginal packings of the **same, are used for the following purposes:**

1. To secure the effect of drugs incorporated in the **gauze or cotton or** held in place by them.
2. To occlude the vagina after operations in its upper part.
3. To stop hemorrhage.
4. To keep inflamed surfaces separated.
5. To support the pelvic organs.
6. To prevent coitus.

Tampons are much used for **holding medicine** against the **cervix and** vaginal vault. If the medicine is in solution, for example, one of the **glycerin** preparations, the end of the tampon is dipped into the solution and then applied to the vaginal vault and left there, to be removed by the patient after twelve to twenty-four hours. If the medicine is a powder, it is dusted freely

about the cervix and some of it is placed on the end of the tampon, which is introduced as before.

When used to **occlude the vagina** after an operation, the gauze or cotton is simply a surgical dressing, the same as when applied to an external wound. The gauze or cotton may be simply sterile or it may be impregnated with some antiseptic, as in bichloride gauze, iodoform gauze, etc.

When gauze or cotton is used to **check hemorrhage** it should first be wet in some antiseptic solution and then squeezed as dry as possible before being packed into the vagina. Used in this way it makes a much more effective hemostatic than when used perfectly dry.

For keeping inflamed **surfaces separated**, tampons of cotton or gauze-strips are used in the various forms of vaginitis.

To **support the uterus** or hold it in position, dry gauze or cotton or wool is used. Wool has more "spring" in it than cotton or gauze, consequently a wool tampon is the best in cases where only support is required. Sometimes the wool tampon irritates the vagina, in which case it may be covered with a thin layer of cotton as before mentioned. When cotton is used for supporting tampons, ordinary cotton is better than absorbent cotton, as the latter absorbs fluids rapidly and soon loses its elasticity. A tampon or tamponade for support should be put in with the patient in the Sims posture or in the knee-chest posture.

TAMPON-CAPSULES

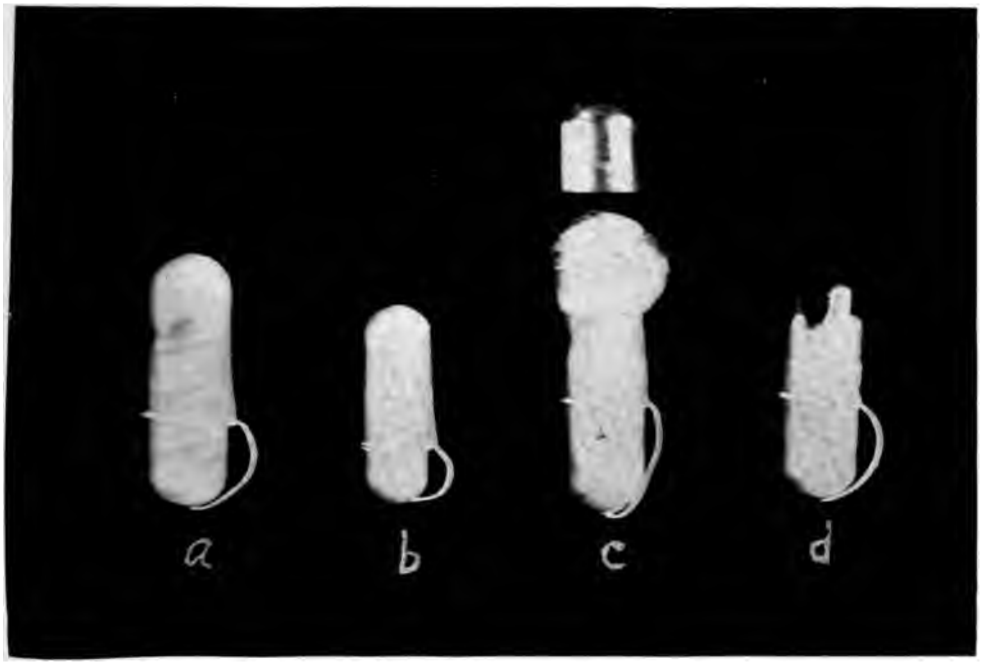


Fig. 227.—Tampon capsules. *a*. Large size. *b*. Small size. *c*. The cap removed, showing the tampon. *d*. A tampon capsule prepared, ready for introduction. The cap was removed and the medicine poured into the cap, which was then replaced. The dark ichthyol mixture shows through the transparent cap.

Ordinarily, all tampons are introduced by the physician. When, however, it is advisable that tampons be applied at home by the patient, between the office visits or in conditions in which the patient cannot well come to the office, the tampon-capsule may be used. The tampon-capsule is a large capsule of special design containing a plain wool tampon with a string attached. There are two sizes (Fig. 227). They come in boxes of a dozen and may be purchased from the druggist or wholesale drug-houses. They are convenient for use immediately after the hot douche, to secure hygroscopic effect. Just before use, the patient removes the cap from the capsule, pours in about a half a teaspoonful of any desired medicine (usually boroglycerin or ichthyol-glycerin), replaces the cap and introduces the capsule, medicated end first, up to the vaginal vault. Here the capsule soon melts, liberating the medicine and tampon, and the latter holds the former in place.

PESSARIES

Pessaries are appliances introduced into the vagina for the purpose of holding the uterus or vaginal wall in proper position. They are made of hard rubber or soft rubber, usually the former. Those made of soft rubber are generally hollow and contain air or flexible wire. Occasionally a pessary is made of glass or block-tin or some other material.

Supporting pessaries are used principally for retrodisplacement of the uterus and for prolapse of the uterus, and hence will be considered in detail under those subjects (Chapter VII). The uterine stem, frequently referred to also as stem-pessary, is simply a cervical plug for keeping the canal well open over a considerable period of time. It is used principally in the treatment of obstructive dysmenorrhea, and is considered in detail under that subject (Chapter XIV). It is used, also, after amputation of the cervix or excision of the cystic area, to insure preservation of a good canal.

CAUTERY

There are two conditions in which the cautery is very useful, namely, cancer and chronic cervicitis. In cancer a large cautery point at a low heat is used to sear and bake the raw surfaces and underlying tissues left after clearing out soft bleeding tissue with the spoon curet (Chapter IX). Certain forms of endocervicitis with eversion, hardly severe enough to necessitate cervical excision, may be greatly benefited by linear cauterization with the small nasal cautery tip (Chapter VI—Fig. 473).

INTRAUTERINE TREATMENT

MEDICATED APPLICATIONS WITHIN THE UTERUS

Effects, Good and Bad

What good can intrauterine applications do?

They may exercise an antiseptic, astringent or anesthetic effect.

They may destroy diseased tissue.

They may exercise a hygroscopic effect.

1. **They may exercise an antiseptic or astringent or anesthetic effect,** limited to the surface to which they are applied. Owing to peculiarities in the nature and situation of the endometrium, an intrauterine application of an **antiseptic** does not ordinarily have much influence in checking the activity of bacteria that have gained a foothold there. The three most important influences limiting bacterial penetration into the uterine wall are (a) an intact epithelial surface, (b) the bactericidal influence of leukocytes and blood serum and lymph, and (c) the absence of irritation (toxic, chemical, mechanical) within the cavity.

In a patient with bacterial invasion of the endometrium, after the uterus has been cleared of placental remnants and good drainage secured (removal of toxic, chemical and mechanical irritation) the issue depends almost wholly on the bactericidal and antitoxic influence of the leucocytes, blood serum and lymph. The efficacy of any therapeutic measure employed must be judged largely by its influence on this battle beneath the surface, rather than by any superficial effect. The beneficial effect of killing a few bacteria upon the surface is more than overbalanced by the local disturbance which the application occasions. It adds irritation to the already great irritation from the bacteria and their products, and it opens up new avenues for invasion, by abrasion of the protecting epithelial covering. In chronic cases, the bad effect of such applications is not great, because nature has the process well limited, but occasionally, even in these cases, there will be considerable disturbance following the application, due to immediate extension of the infection deeper into the uterine wall or into the tubes or parametrium. In the acute and subacute stages of bacterial invasion of the uterus (puerperal or non-puerperal) an intrauterine application very frequently causes an aggravation of the trouble, as evidenced by a chill and a sharp rise of temperature within a few hours.

It may be stated as a general proposition, that intrauterine applications for antiseptic effect, in the acute, subacute or chronic stages of bacterial invasion, do more harm than good. The harm is due, not to the presence of the antiseptic, but to the abrasions of the endometrium incident to the application.

The use of an **astringent** intrauterine application is advisable in certain exceptional cases of persistent bleeding or free discharge from the endometrium, not dependent on bacterial invasion or a new growth. There are many cases of bleeding (especially menorrhagia) due simply to chronic congestion and hyperplasia of endometrium. It is principally in those dependent on subinvolution and which have not been relieved by internal treatment (laxatives, general tonics, uterine astringents) and hot vaginal irrigation and other measures directed towards diminishing the pelvic atony and congestion, that local astringent applications are of service.

In most of these persistent cases it is preferable to remove the thickened endometrium with the curet. But in some cases the symptoms are hardly sufficient to demand curettage, or the patient objects to it. In such a case a few astringent applications to the endometrium, made under proper precautions, may do some good without doing damage. A few abrasions of the epithelium by an aseptic application in such a case, are of less consequence than when made in an infected cavity where there are bacteria ready to enter the abrasions. Also, the chemical and mechanical irritation is better borne because there is no deep-seated bacterial activity. The discomforts and difficulties of a satisfactory intrauterine application in the virgin are such that when intrauterine treatment is necessary, thorough dilatation under anesthesia and curettage is usually the preferable method.

In infective endometritis, the application will probably do more harm than good, except in those old cases in which the bacteria are dead or so attenuated that the condition is practically one of simple endometritis.

In bleeding due to fibroids or malignant disease, astringent applications exercise no influence over the course of the disease, and may cause infection and thus increase the danger of the necessary operation. For temporary control of bleeding while waiting for operation, general measures and internal medication and firm vaginal packing will nearly always suffice. For the inoperable cases, other methods more effective are at our disposal.

An **anesthetic** application, such as cocaine or orthoform, is useful when applied about a sensitive internal os, preceding dilatation of the same. The pain is usually considerably diminished. Applications of anesthetic substances to the endometrium proper are of little benefit and present the dangers common to all intrauterine applications.

2. **They may destroy diseased tissues.** Destruction of the endometrium by cauterization was formerly much practiced in cases of persistent bleeding or discharge. It has been found, however, that in all but exceptional cases, a curettage is more effective and leaves the uterus in better condition for regeneration of a healthy endometrium.

3. **They may exercise a hygroscopic effect.** This effect, secured by the small amount of hygroscopic material retained in the uterus, is so slight that intrauterine applications for this purpose are not advisable.

What harm can intrauterine applications do?

Same that vaginal applications may, and also:
May carry infection into the uterus.
May increase bacterial disturbance already in the uterus.

1. **They may cause the same** harmful effects that vaginal applications may. That is, they may (a) cause patient to come to office when she should be resting at home, (b) cause postponement of effective treatment until the disease is past cure and (c) convert a neurasthenic or hysteric individual into a confirmed invalid by fixing attention on some trivial local disturbance.

2. **They may carry infection** into the uterus and change some simple disturbance into a very serious one. This has happened many times and constitutes one of the most serious objections to intrauterine applications. By taking proper care of the cervical canal with an antiseptic, infection can usually be avoided. But even with this care, infection may be carried in an apparently healthy cervix. It is an ever-present danger and must

balanced by the probable benefit in the particular case, before an intrauterine application is advisable.

3. **They may increase a bacterial disturbance** already in the uterus, as previously explained.

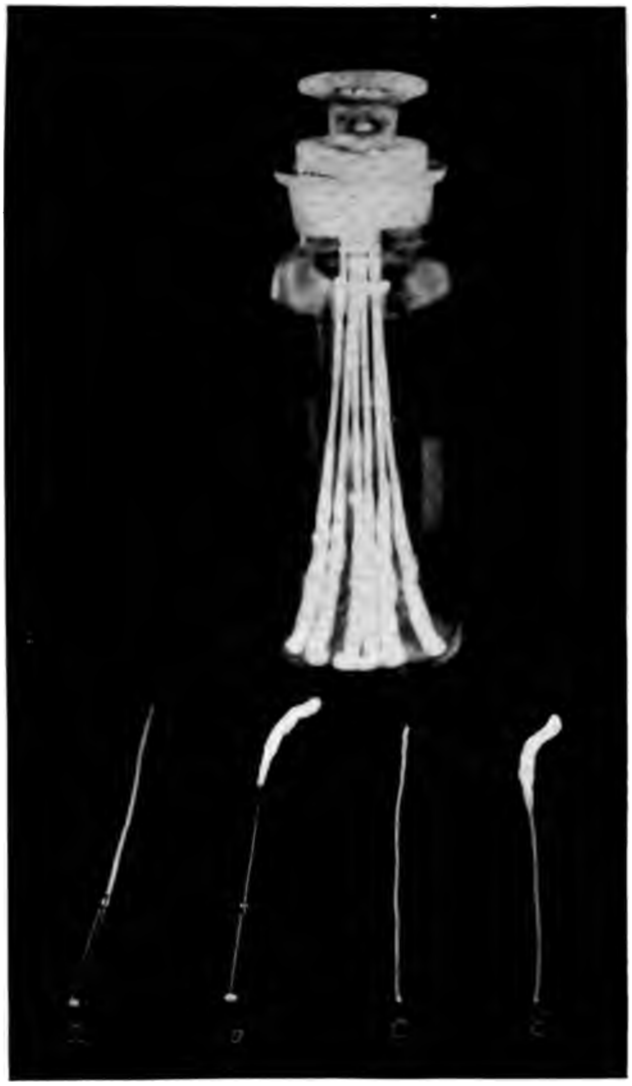


Fig. 228.—Applicators for intrauterine treatment. *a.* The ordinary handled applicator. *b.* The ame wrapped with cotton, preparatory to dipping it into the medicine to be applied within the uterus. Plain aluminum wire applicator, nine inches long. *d.* The same wrapped with cotton. The jar conins prepared applicators like (*d*), and is ready to receive the solution in which they are to be kept.

Methods of Intrauterine Application

1. With Cotton-wrapped Applicator. An intrauterine application is made wrapping, with disinfected fingers, a small amount of absorbent cotton at the end of an applicator (Fig. 228, b), saturating the cotton with the red medicine and then carefully introducing it through the cleansed and dilated cervical canal into the cavity of the corpus uteri. In making an intrauterine application, the same antiseptic care must be observed as in sounding the uterus.

It is well to prepare a number of cotton-wrapped aluminum applicators (Fig. 228, c) and have them in sterile wide-mouthed bottles (Fig. 228), some dry sterilized and others in some of the solutions frequently used. Then you can be certain that the cotton on your applicators is sterile, as it is very likely not to be if it is twisted on hurriedly during the office treatment, for it is difficult to sterilize the fingers and keep them sterile.

2. **With Gauze.** Another method and a very effective one for bringing medicine in contact with the endometrium, is to soak the end of a small strip of antiseptic gauze in the medicine and carry it into the uterus and leave it there. The remaining part of the gauze is packed against the cervix to hold the uterine portion in place. The other end of the gauze is brought near the vaginal outlet so that the patient may remove it after several hours.

3. **Slippery-Elm Applicator.** A method somewhat similar to the last mentioned, is the use of a small slippery elm tent, sterilized and dipped in the medicine and carried into the cavity and left there. A string is attached by which the patient can remove it as directed.

4. **Uterine Suppositories,** or soluble uterine bougies, furnish another method of applying medicine to the endometrium. Protargol and iodoform are the medicines usually incorporated in them.

It is possible that there will be worked out along this line, a method of making effective antiseptic and astringent applications without mechanical disturbance of the endometrium. If so this might prove of decided help in the treatment of bacterial invasion, in both the acute and chronic stages. The author believes that more will be accomplished in this direction by using the penetrating antiseptics, such as collargolum or Credé's ointment, than by the use of the surface antiseptics usually employed.

The injection of medicines into the uterine cavity by means of the intrauterine syringe, the author cannot recommend. Its danger outweighs its advantages.

For What Effects Indicated

As previously explained, the only intrauterine applications advisable ordinarily are those for an astringent or anesthetic effect in the non-infected uterus, and even these only in exceptional cases and for a short time.

Long continued intrauterine applications do little or no good and may do much harm. They may cause the inflammation to extend deeper into the uterine wall or into the parametrium or into the fallopian tubes; if no decided beneficial effect is apparent from a few applications, made at intervals of several days, they should be discontinued and more effective measures employed.

Medicines Used for Intrauterine Application

The medicines used for **astringent effect** are:

Protargol, 5 to 10 per cent.
Formol, 20 to 40 per cent.

Iodized Phenol (Tinct. iodine and carbolic acid, equal parts).
Carbolic Acid, 10 to 95 per cent.
Copper Sulphate, 10 per cent.

The medicines used for **anesthetic effect** are:

Adrenalin Chloride, 1-1000.
Cocaine Hydrochloride, 10 to 20 per cent.
Orthoform.
Chloretone.

Local anesthetic applications are seldom used within the uterus. About the only indication is for the diminution of pain due to dilatation of the cervical canal. A few minutes before the dilatation an application of the desired local anesthetic is made along the canal, especially about the internal os which is the most sensitive part.

INTRAUTERINE IRRIGATION

Intrauterine irrigation is employed in the treatment of **acute endometritis**, particularly that form caused by infection following labor or abortion. With the same antiseptic precautions as for sounding the uterus, the double current irrigating tube is introduced into the uterine cavity and a large amount (half a gallon to a gallon) of hot sterile water, or normal salt solution, is allowed to pass slowly through the uterus. This removes mechanicaly a large amount of the infective material and the effect of the hot water is beneficial in tending to allay the inflammation. In some cases of puerperal sepsis, this irrigation is sufficient to check the trouble, but in other cases there remains infected material that must be removed by the finger or curet. One thorough irrigation is usually all that is advisable provided the uterine cavity drains well. Of course, if there is distinct retention of pus within the uterus then the cervix must be opened and the pus washed out as often as such retention occurs. Intrauterine irrigation has been used also in the treatment of acute gonorrheal endometritis but the effect was not such as to encourage its use.

CURETTAGE

Curettage of the interior of the uterus is a most effective method of intrauterine treatment. It is employed especially in hyperplastic and chronic inflammatory conditions of the endometrium causing persistent bleeding or discharge. It is considered in detail in Chapter VI (see Figs. 502 to 509).

CERVICAL DILATATION

The thorough dilatation under anesthesia which precedes curetment is considered in Chapter VI.

Partial dilatation in the office may give considerable relief in cases of dysmenorrhea and it is used also in the treatment of sterility. The methods of making partial dilatation are given in Chapter I and in Chapter XIV.

VACUUM TREATMENT

Suction has been applied to the uterine cavity by means of an apparatus fitting over the cervix and extending into the cavity. By means of a suction pump the uterine secretion is drawn out and a partial vacuum created, causing passive congestion of the endometrium. It is an application of Bier's "congestion treatment," which has been found useful in certain general surgical affections. It has been used principally in the treatment of chronic endometritis. The reported cases show that the treatment must be long continued and the results finally secured are apparently no better, if as good, as those given by the more common and less tedious therapeutic methods.

APPLICATIONS TO THE LOWER ABDOMEN AND INTERIOR OF PELVIS

PELVIC MASSAGE

Pelvic massage is the application of the principles of massage to the intrapelvic structures.

The effects to be attained are:

Correction of displacement of the uterus, tubes and ovaries.
Stretching of adhesions and infiltrated tissues.
Improvement of pelvic circulation (lymph and blood).
Absorption of chronic exudates.

Details of Application

Perhaps the best way to introduce this important therapeutic method is to consider it as a continuation of, or addition to, the ordinary bimanual examination. When there is displacement of the uterus, with or without adhesions, the bimanual examination by which the diagnosis is established, has also a therapeutic value.

Take, for example, a case of retrodisplacement in which the uterus can be brought forward but will not stay there. By bringing the uterus forward in the bimanual examination, the diagnosis of movable retrodisplacement is established. Then search is made to discover why the uterus will not stay forward. Suppose it is found that the anterior vaginal wall or vesico-vaginal septum is shortened, as sometimes happens. Whether this is a primary or secondary change is not of so much importance as the fact that it exists, and constantly keeps the cervix so far forward that the fundus uteri tends to go backward. Of course, when in the bimanual examination the fundus is brought forward, the cervix is pushed backward and upward and the fundus is at the same time bent forward over the tips of the examining fingers in the anterior fornix, to take out any flexion in the body of the uterus.

Now, if instead of ceasing this intrapelvic work as soon as the diagnosis is established, we continue to stretch the shortened vesico-vaginal septum, a decided therapeutic effect tending to permanent correction of the displacement is secured. The contracted tissues anterior to the cervix are made tense and stretched even up to the point of painfulness, and we endeavor all the time to place the cervix farther back in the pelvis as the tissues gradually yield. Force sufficient to damage the tissues or cause severe pain should not be used, the object being to gradually lengthen the tissues as much as possible without damage. In doing this we perform one of the important manipulations of pelvic massage, namely, **stretching**. This stretching may be done with the vaginal fingers alone, but the holding of the fundus uteri well forward at the same time, with the fingers of the abdominal hand, makes it more effective. There may be a restricting band running obliquely toward one obturator foramen, or transversely toward the pelvic wall in the base of the broad ligament. Whatever the direction of the band, it is to be stretched.

This process of stretching is somewhat painful and may be followed by a sense of fullness and pain in the stretched structures. It has been found by experience that these discomforts are diminished and the softening and stretching of the tense tissues facilitated by sweeping pressure, so directed as to work the lymph and venous blood out of the tissues toward the pelvic wall. This permits the more rapid entrance of fresh blood and hastens the absorption of serous and cellular infiltration. This sweeping pressure is applied by the finger-tips or the knuckles of the abdominal hand, worked far down into the pelvis to the tissues under treatment. The fingers of the abdominal hand depress the abdominal wall to the affected tissues, which tissues are, at the same time, raised as much as possible by the vaginal fingers. The infiltrated tissues are now compressed between the vaginal and abdominal fingers. The abdominal fingers, still keeping up the pressure, are made to describe a small circle or ellipse. In the lower part of the circle, which lies directly over the tissues under treatment and where the direction of movement is from within outward, the strong pressure is made. In this movement, the abdominal fingers remain at the same spot on the skin. This is essential for, if the pressure is relaxed enough to allow the fingers to slip over the abdominal surface, no deep effect can be obtained. The skin is freely movable over the deeper structures of the abdominal wall, and one point can easily be carried through the small circle described. In some cases, where the abdominal wall is very thin and lax, the whole thickness of the wall may follow the fingers to some extent. The vaginal fingers are not moved in the least. They remain perfectly stationary, being required only to elevate the infiltrated area so that it can be subjected to compression by the fingers above. The application of this sweeping pressure, as just described, constitutes that other important manipulation of massage known as **kneading**.

These two manipulations, STRETCHING and KNEADING of shortened and infiltrated tissues or of adhesions, constitute the essentials of pelvic massage in ordinary cases. Whether the infiltrated area or the tense band is at the lower part of the broad ligament or the upper part, whether it binds the uterus backward or forward or laterally or holds an ovary or tube in abnormal position, the principles of manipulation are the same, namely, to stretch the adhesions or shortened tissues and to work the lymph and venous blood out of them towards the pelvic wall. The clothing must be well loosened so that there is no constriction forcing the intestines into the pelvis. The bladder and rectum should be empty—therefore direct the patient to take an enema an hour or two before coming for treatment and to empty the bladder just before treatment. The manipulations must always be gentle at first, gradually increasing in force as the tenderness diminishes. Painful points should not be passed over directly or carelessly but circled about and approached gradually.

As to the length of the seance and the frequency of repetition, the physician is guided by the conditions present and the effect produced. The idea is to stretch the tissues and remove infiltration as quickly as possible, but if too much force is used or the seance made too long the resulting irritation may increase rather than diminish the infiltration. The treatments should be far enough separated so that the irritation from one, as evidenced by pain and soreness, has largely subsided before the next is given. This, of course, will vary much in different cases. A seance of five or ten minutes repeated from every second day to every other week, are about the requirements. The cases must be carefully selected, and if no decided benefit is apparent after a few treatments, they are stopped and more effective measures employed. Of course, other measures are to be used in conjunction with this treatment as indicated—general measures, internal treatment, hot vaginal douches, pessaries, etc.

Indications for Pelvic Massage

Pelvic massage is of benefit principally in cases of uterine displacement accompanied by the sequelae of a pelvic cellulitis (real parametritis) or by old peritoneal adhesions without active pelvic inflammation. It is useful also in some cases of the same connective tissue or peritoneal inflammatory sequelae without important displacement of the uterus, the improvement in these cases being due probably to the removal of cellular infiltration and stasis edema of the tissues, the relief from pressure of constricting peritoneal bands and the improvement of the lymph and blood circulation in the pelvis. It is useful also in exceptional cases of a persistent large mass of exudate, but only where all active inflammation has disappeared and Nature has failed to make the usual prompt removal of exudate when it is no longer needed for limiting purposes.

Inflammation of the **connective tissue** in this region, as in other regions, runs its course rather rapidly, ending in resolution or in the formation of an abscess which is opened or opens itself. In either case the active inflammation soon subsides, leaving no persistent focus of active inflammation, but only the sequelae, consisting principally of scar-tissue and cellular infiltration and the circulatory disturbance of lymph and blood resulting therefrom. These are just the conditions most susceptible to improvement by massage. Furthermore, in this condition comparatively little can be accomplished by operative work. There is no focus of persistent inflammation to be excised, no intraperitoneal mass of exudate to be removed, no intraperitoneal bands to be broken. The cellular infiltration and the bands of scar-tissue lie under the peritoneum among important vessels and nerves and other structures, and are of such nature and so situated, that their excision is not, ordinarily, desirable or practicable.

Allied to these cases, as regards their suitableness for massage, are the cases of retrodisplacement without infection in which the persistence of the displacement seems to be due, to considerable extent at least, to a shortening of the upper posterior part of the broad ligament. This is found in certain troublesome cases of retrodisplacement in women who have never been pregnant. It constitutes the cause of failure in some cases submitted to the ordinary operative procedures for retrodisplacement. It is not affected by such measures unless the involved tissues are directly divided or over-stretched at the time, and this must be done carefully or important structures will be injured. In some cases this contraction is hardly appreciable during the operative work, the uterus coming forward without much resistance, but the constant slight pull maintained by this tense tissue is sufficient to gradually draw the uterus back again into retrodisplacement. In cases of retrodisplacement, the intrapelvic conditions should be carefully studied by bimanual examination, to determine just what holds the uterus backward or what causes it to go backward after replacement.

Contraindications to Pelvic Massage

When there is marked tenderness or where there is marked hyperesthesia of the pelvic organs or of the vagina or of the external genitals, pelvic massage is contraindicated. It is contraindicated also in the presence of acute inflammation, a collection of pus, active salpingitis, pelvic tuberculosis, malignant disease, and pregnancy.

PRESSURE TREATMENT

Pressure treatment is applied by means of mercury distending a colpeurynter which has been introduced into the vagina, the hips having been elevated to properly direct the pressure. It is used principally in adherent retrodisplacement of the uterus, and the details concerning it are given under that subject (Chapter VII).

APPLICATIONS TO BODY GENERALLY

BATHING

Regular bathing for hygienic purposes is necessary to keep the patient in good general health. Also hot baths or cold baths may be required for their special effect on the patient's nervous system.

The hydrotherapeutic methods particularly useful in gynecologic cases (vaginal douches, moist applications to lower abdomen, sitz-baths) have already been described.

FRICTION RUBBING

Friction rubbing of the general body surface with alcohol or salt or a brush or a rough towel, which the neurologists have found so extremely useful in atonic conditions of the nervous system and of the body generally, is often indicated in gynecologic cases. The fact that the patient is under treatment for some pelvic disease should not prevent her receiving such other treatment as is necessary. After operation for pelvic disease which has caused marked deterioration of the general health, it is important to employ general measures in conjunction with the local measures in order to complete the restoration to health.

The detailed consideration of these various general measures would take up too much space and would be somewhat out of place in a work of this character. The author must content himself with calling attention to the importance of their intelligent use in gynecologic cases.

GENERAL MASSAGE

General massage also is invaluable in the treatment of certain conditions of physical depression caused by or associated with pelvic disease. The cases referred to are those in which the vital forces are apparently "worn out" by long suffering, chronic septic absorption, autointoxication or faulty metabolism. The object is to produce a general tonic effect upon the muscular, circulatory, nervous, digestive, respiratory and excretory systems.

General massage, like other general measures, belongs to general medicine and its description is not called for here.

Pelvic massage has already been considered.

DRESS CORRECTION

It is not the author's purpose to take up in a general way the subject of dress as it relates to health. He simply desires to mention some items that have a special bearing on the treatment of pelvic disease.

Constriction at the Waist.—By waist constriction the abdominal contents are forced downward towards the pelvis, and thus the pelvic contents are subjected to abnormal pressure. This abnormal pressure interferes with the circulation in the various pelvic organs, causing poor nutrition and chronic congestion.

This injurious pressure helps to bring about the following abnormal conditions. In the young woman, the nutrition may be so interfered with that perfect development is not attained. In the adult, the chronic pressure and congestion tend to cause chronic endometritis, displacements of the uterus and chronic irritation and enlargement of the ovaries. Following parturition, the persistent congestion tends to cause subinvolution and chronic endometritis. In laceration of the pelvic floor, the pernicious effects of the laceration are much increased by the constant strong downward pressure of the abdominal contents. In retrodisplacements of the uterus, the fundus uteri is forced still further into the abnormal position by this downward pressure from above, and the ovaries also are forced down beside the displaced uterus. In prolapse, the structures are constantly forced further and further out of the pelvis and, in addition, there is caused a general splanchnoptosis. This tendency of waist constriction to cause permanent displacement of various abdominal organs, adds many abdominal symptoms to those of the pelvic disturbance.

Dragging Weight at the Waist Line.—To support heavy skirts by means of a string tied around the waist is as injurious as the wearing of a faulty corset. The heavy skirts drag down the abdominal organs towards the pelvis and produce injurious pressure on the pelvic organs.

Correct Clothing Support and Corseting.—To prevent these injurious effects, all constriction should be removed from about the waist and the clothing should be supported from the shoulders, as has been insisted upon so strongly by those who have given much careful study to the relation of the clothing to bodily health, strength and beauty. This is advisable in well persons, but is imperatively important in those suffering with pelvic disorders. Any "corset" or "support" or "stay" or "girdle" that is used, should make no constriction above the iliac crests.

The corset should be adjusted in such a way that it is firmly applied about the hips and is perfectly loose about the waist. The ordinary straight-front corset so adjusted is very helpful in that it tends to support the abdominal organs, instead of dragging them down, holds the pelvic joints well together, and gives the support along the back to which the patient is accustomed. The author does not care to enter the controversy on the general subject of "corset or no corset" in healthy women, but he is convinced that in most gynecological patients of the present day a properly adjusted corset is decidedly beneficial in the ways mentioned.

After operation, also, the ordinary straight-front corset, adjusted as indicated, gives excellent support to the newly healed abdominal wall, and at the same time gives the general corset-support desired by the patient. The author found the ordinary corset properly adjusted so much more satisfactory than the abdominal belts and special supporters formerly used after operation that he discarded the latter entirely. For several years he has used only the ordinary corset for postoperative support, except in cases of marked obesity or other special condition requiring special forms of support.

POSTURAL METHODS AND EXERCISE

KNEE-CHEST POSTURE

The patient supports herself on the knees and chest (Fig. 229). The head rests on a pillow, with the face turned to one side, and the breasts are brought as closely as possible against the table or bed. To take the correct posture and thus secure the desired effects, particular attention must be given to three details as follows:

a. The clothing must be well loosened about the abdomen—hence the best times to take this postural exercise at home are in the evening just after going to bed, and in the morning just before rising.

b. The thighs should be perpendicular as shown in Fig. 229, so as to raise the hips as high as possible. Unless particular attention is paid to this point the thighs are likely to slant backward (Fig. 230) or forward, and part of the desired elevation is missed.

c. The back should be curved downward and elbows gotten out of the way so that the breasts come against the bed (Fig. 229). This is to bring the chest as low as possible and give a steep inclination to the peritoneal cavity, so that the pelvic contents will gravitate towards the abdomen. Fig. 231 shows a common error in this respect, the chest being still too high.

The effect of the knee-chest posture is to temporarily take all downward pressure off the pelvic organs and permit them to gravitate toward the abdominal cavity (Fig. 229). The downward pressure on the pelvic organs is for the time being relieved, the local circulation is greatly improved and a movable retrodisplaced fundus uteri tends to gravitate forward towards the normal position. The effect is much increased if the vagina be opened with a speculum or with the fingers so that air may enter. The position may be maintained from one to ten minutes.

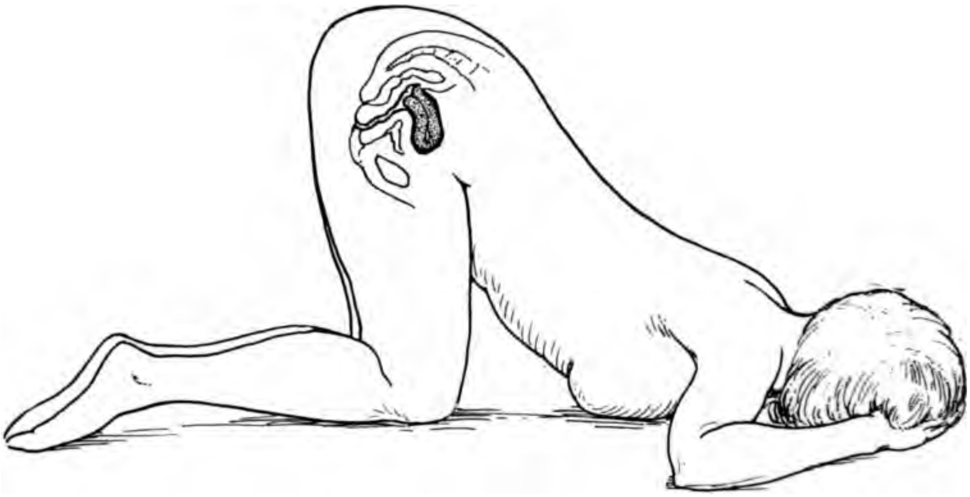


Fig. 229.—The knee-chest posture, showing the pelvic structures in outline and the tendency of the uterus to gravitate forward.

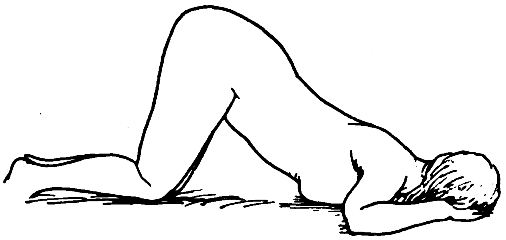


Fig. 230.

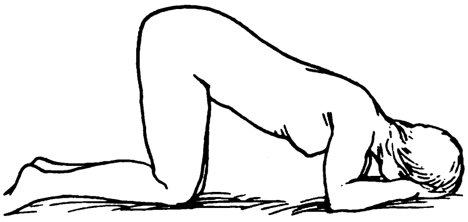


Fig. 231.

Fig. 230.—Incorrect knee-chest posture. The knees are too far back.
Fig. 231.—Incorrect knee-chest posture. The chest is not brought down to the bed.

Indications for Knee-Chest Posture

The knee-chest posture is used **in office treatment** for the following purposes:

To assist in replacing an ordinary movable retrodisplaced uterus.

To assist in replacing a pregnant retrodisplaced uterus.

To assist in pushing a tumor, impacted in the pelvis, back into the abdominal cavity.

To assist in replacing a vaginal hernia.

To hold the uterus as near as possible to normal position while introducing a vaginal tamponade, for retrodisplacement or for prolapse.

Fig. 446 shows the patient in the knee-chest posture and draped with the sheet for treatment.

The knee-chest posture is used by the patient **at home** as an aid in the treatment of the following conditions.

Retrodisplacement, especially when the uterus cannot be entirely replaced or shows a tendency to return to the backward position. It is particularly useful in retrodisplacement with frequency, in which local pressure and manipulation are to be held to the minimum.

Downward displacement of the pelvic organs, from laceration of the pelvic floor or from beginning prolapse or from simple relaxation and intraabdominal pressure.

The venous congestion and consequent heaviness of the organs is for the time being relieved and the beneficial effect is sometimes noticed for hours afterward. The patient is directed to take the posture ordinarily for one or two minutes twice daily. Usually the most convenient time is while in bed, just after retiring in the evening and just before rising in the morning. Used for two or three months after labor, this is exceedingly useful in preventing retrodisplacement of the uterus.

TRENDELENBURG POSTURE

In the Trendelenburg posture the hips are elevated with patient lying on the back. The elevation of the hips may be moderate or extreme, as required by the particular case. This posture is used principally in operative work, though it is sometimes useful in diagnosis and in minor gynecologic treatment. It is employed in the pressure-weight treatment (Chapter VII), in pelvic massage in certain cases where it is important to get the intestines out of the pelvis, and also in cases where it is desired to employ gravity in moving an abdominal or pelvic organ upward towards the abdominal cavity but in which the patient cannot take the knee-chest posture.

EXERCISE

General Exercise.—Exercise in the form of walking, horse-back riding, swimming, outdoor games and general gymnastic movements (both outdoors and indoors) may be required in patients presenting pelvic disturbance depending on depression of the general health, particularly in certain forms of amenorrhea. These measures are used, however, almost exclusively for their effect on the general health, and the description of the details of their application belongs to general medicine.

Special Exercise.—There is one useful and simple procedure that is particularly applicable to certain gynecologic patients. The author refers to voluntary contraction of the muscles of the abdominal wall. This is one of the most effective measures that can be employed in the treatment of that affection which is so distressing to many women, namely, prominence of the abdomen from relaxation of the wall. This is seen principally following confinement, the abdominal muscles, overstretched from the pregnancy, having never regained their tone. The strengthening of the abdominal wall gives better support to all the abdominal organs and is beneficial in enteroptosis, chronic constipation and other conditions influenced by loss of abdominal wall support.

The exercise consists in the patient's raising the head and shoulders from the recumbent to the half-sitting posture (Fig. 232). The raising should be done entirely by the abdominal muscles. If the arms are allowed to lie beside the patient in bed they are likely to be used in the raising, hence they should be gotten out of the way by folding the arms over the chest (Fig. 232) or by placing the hands behind the head. The shoulders are raised slowly by the abdominal muscles then held a few seconds and then allowed to go back. This process is repeated several times for the central muscles, and then for the lateral group of each side by raising obliquely to that side.

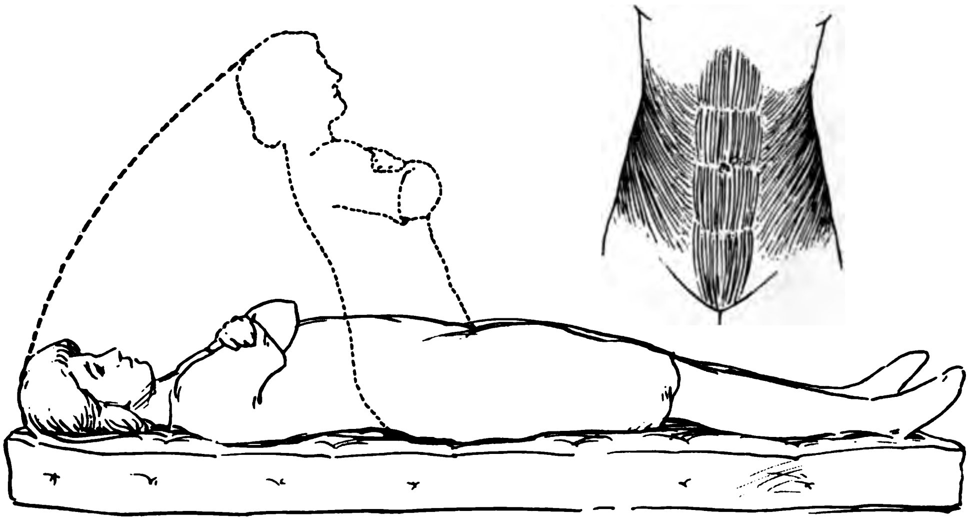


Fig. 232.—The "raising exercise" to strengthen the abdominal muscles. The central abdominal muscles are exercised by raising straight up and the lateral muscles by raising laterally.

The object is not to raise to the sitting position but simply to exercise the abdominal muscles by raising the head and shoulders a moderate distance. As the muscles become stronger the raising will extend higher until finally it may be carried easily to the sitting position. However, when that position is reached the muscular exercise automatically ceases, so that most benefit is obtained when the movement stops short of complete sitting up.

The movements are most effective when made slowly, so as to get long contraction of the muscles. At first only a few movements are taken. As the muscles become stronger the number is increased until ten to fifteen movements for the central muscles and for each of the lateral groups are taken. The clothing must of course be loosened, hence the best times are in the evening after retiring and in the morning before rising. This exercise combines very well with the knee-chest posture in patients requiring the latter, the raising exercises being taken first and the knee-chest posture immediately afterward.

INTERNAL TREATMENT

Internal treatment may be in the form of medicines or of diet or of psychotherapy.

MEDICINES

Internal medication affects pelvic lesions principally in an indirect way—by improving the quality of the blood supplied to the pelvic organs, by relieving congestion and bettering the pelvic circulation, by toning up the nervous system, etc. These indirect effects, however, are often of decisive importance.

The author wishes her to call attention to certain classes of internal remedies that are frequently indicated in the treatment of patients with pelvic disease.

1. **Uterine Astringents.**—To this class belong ergot, pituitrin, stypticin and hydrastis. Ergot and pituitrin cause contraction of involuntary muscular tissue. The uterus is composed principally of such tissue, consequently ergot and allied substances have a marked tonic effect on the uterine wall. The relaxed and dilated uterine blood vessels are narrowed, the chronic congestion is relieved and the tendency to inflammatory infiltration diminished.

This class of remedies is beneficial in all conditions of chronic uterine congestion and hemorrhagic tendency, except those connected with pregnancy.

2. **Laxatives.**—It is difficult to appreciate the full value of laxatives in the treatment of patients with pelvic disease until the marked benefit due to them becomes a matter of personal observation through years of experience. The intelligent and systematic use of saline purgatives in acute inflammatory conditions and of the milder laxatives (cascara sagrada, etc.) in chronic pelvic diseases is one of the greatest aids in restoring the organs to their normal conditions, where such restoration can be accomplished by minor measures, and in preparing the structures for successful operative work in the cases where operation is necessary. A constantly loaded rectum and colon chokes the pelvis mechanically, causes chronic pelvic congestion, both by direct pressure and by irritation and also by contributing to an atonic condition of the pelvic tissues, and depresses the general health by autointoxication from the intestinal contents.

3. **Sedatives.**—In various conditions sedatives are required, either on account of local pain or because of marked general nervousness. In ordinary pelvic distress, consisting of a mixture of pain and pressure and fullness, the preparations containing viburnum prunifolium usually give some relief. If there is simply general nervousness and sleeplessness, sodium bromide is

effective. If there is associated bladder irritability, hyoscyamus in combination with potassium citrate or other alkaline tends to lessen the vesical tenesmus. When there is severe pain, stronger analgesics are required, for example, codeine in combination with phenacetin, and if there is still no relief it may be necessary to give morphine. The latter, when given at all, should be given in such form that the patient does not know what she is taking. For that reason it is preferable to give it in a capsule in combination with some indifferent substance rather than in the usual small tablets, the contents of which are at once surmised by most patients.

4. **Tonics.**—Tonics containing iron are, of course, indicated in anemic patients, and it is usually advisable to give also some one or more of the general tonics, such as strychnia, quinine, arsenic, etc.

5. **Organo-therapy.**—The use of animal extracts or desiccated tissue from various glands, has assumed a new importance as our knowledge of the ductless gland system has increased. This important form of therapy is considered in detail in the special chapter on the endocrine glands (Chapter XV).

6. **Antitoxin and Bacteria Treatment.**—The most striking and certain effects of antitoxin therapy are seen in the cure of diphtheria by diphtheria antitoxin and the prevention of tetanus by antitetanic serum. Antistreptococcic serum has occasionally proved beneficial in puerperal infection and in other forms of acute streptococcic invasion.

Bacterin treatment, or vaccine treatment as it is frequently designated, is based upon the idea of increasing the leucocytes (bacteria-destroying white cells) by injecting killed bacteria or their products in increasing doses. Stock bacterin put up by reliable firms may be used. In those cases in which a blood culture shows bacteria, it is well to have an autogenous bacterin preparation made.

The results of bacterin treatment are variable. Some serious cases are greatly benefited while in others there seems to be no effect. The fact that this treatment is of decided benefit in some of the desperate cases of bloodstream infection, indicates its employment in those cases. Through the effects secured in many very serious cases the author has acquired a confidence in the treatment which remains unbroken by the skeptical references and theoretical arguments so much in vogue of late.

7. **Foreign Protein Treatment.**—The injection of any foreign protein into the system tends to stimulate leucocytosis and resistance to invading bacteria. For many years this has been used to some extent by the employment of antitoxic serums and of bacterin treatment, and it is possible that the foreign protein in these injections is responsible for the principal part of the effect produced. However, the amount of foreign protein in these long-used injections is comparatively small.

Recently much larger amounts of foreign protein have been injected in the form of milk, with marked beneficial results in many forms of acute inflammation, including pelvic inflammation. This treatment is still too new to be adequately judged; but the results so far have been very encouraging, and warrant continued and extensive trial in acute and subacute inflammatory conditions in the pelvis. The treatment consists of the intramuscular injection of 5 to 10 c.c. of sterilized milk. As this treatment is used principally for acute pelvic inflammation, the details of it are given under that subject (see Chapter X).

7. Special Medication.—In many patients with pelvic disease there are complicating or associating disturbances that require treatment, such as disease of the stomach, liver, lungs, kidneys, etc. Care should be taken that such coincident affections be not overlooked, for they, as well as the pelvic lesion, must receive proper treatment in order to restore the patient to health. The relation of various other organs to the genital system is taken up in detail in Chapter XVI.

DIET

A comprehension of the principles of proper diet and an intelligent employment of them is necessary in overcoming malnutrition and in rescuing patients from the depraved general health occasioned by certain pelvic diseases. In this connection, however, the diet has to do primarily with the general nutrition and only remotely with the pelvic lesion. The principal way in which the details of diet enter directly into the treatment of pelvic lesions is in the after-care of operative cases, consequently, such details of diet will be given in Chapter XVIII.

PSYCHOTHERAPY

Many nervous affections require psychotherapy, such as competent and discriminating neurologists are using more and more. This subject has been carefully investigated in recent years by reliable physiologists and clinicians, and methods of treatment have been worked out which, in conjunction with necessary medication or operative measures, will greatly hasten the cure in many cases, and will restore to health some patients otherwise incurable.

RADIUM

Cancer.—Radium is one of our most effective remedies against cancer. It has a selective action on cancer cells, insofar that cancer cells may be destroyed without serious injury to adjacent tissue cells. This selective action depends on the fact that cancer cells are younger, less stable and consequently less resistant to destructive influences than the surrounding mature tissue cells. This difference in resistance is apparent also in regard to heat. That is, in a cautery incision through a malignant growth the cancer cells are killed over a certain area in which the tissue cells still maintain vitality. This fact has long been noted and used in the handling of malignant growths. If the application of heat be prolonged and carefully graduated, the zone of selective action may be somewhat widened, but at best it is a very narrow zone. With radium, however, the zone of selective action is wonderfully wide. With proper screening, to limit the burning rays, the selective devitalizing action on cancer cells may be extended to six centimeters or more. The effective destructive action varies much in different cases, however, and we cannot yet be certain in a particular individual just how far the cancer cells will be completely devitalized. In addition to the direct devitalizing effect on the cancer cells, there is a stimulation of the connective tissue, causing proliferation. This connective tissue proliferation isolates the remaining nests of cancer cells and the subsequent contraction diminishes their nutrition. In a certain zone this process eventually starves to death the already damaged cancer cells, while farther out the cancer-cell nests lie dormant for a longer or shorter period. It is hoped in time, by proper screening, dosage and technic of application, to extend the effective selective action so that we can depend uniformly on killing the cancer cells to the limit of the pelvic cavity, but that ideal has not yet been attained. The selection of cases for radium treatment, the combination with x-ray or operation, and other items, are taken up under cancer of the uterus and other forms of cancer.

In the application of radium for pelvic cancer, precautions must be taken against two serious harmful effects. First, there is danger of sloughing, extending into the rectum or bladder or ureters. There is a certain area immediately about the radium in which all tissue is destroyed. The limitation of this area, without interfering with the therapeutic effect of the radium, requires judgment in the use of metallic screening and of tissue screening and of distance screening by gauze packing. Second, in some cases after heavy radium treatment there has occurred an exaggerated connective tissue contraction, or fibrosis, eventuating in painful nerve constriction and even in occlusion of the rectum. As mentioned above, a certain amount of connective tissue contraction is expected and is beneficial in that it tends to further devitalize cancer cells by pressure and starvation. But the exaggerated contraction now under consideration is a serious matter. It causes severe suffering, and in some cases has necessitated colostomy, and even excision of the contracted and painful rectum. The avoidance of this relentless, progressive, nerve-gripping contraction constitutes one of the difficult problems of radium work.

Myoma.—Radium is an effective remedy also in selected cases of uterine myoma and in certain cases of persistent uterine bleeding from other causes. It is particularly useful in hemorrhagic conditions near the menopause. Its application should always be accompanied or preceded by diagnostic curettage, to determine whether or not malignancy is present. As its antihemorrhagic effect is dependable to a considerable extent on its influence in checking ovarian function, its use should generally be avoided in younger women. The selection of the particular cases suitable for radium treatment is taken up under the various topics (uterine myoma, menorrhagia, metrorrhagia, etc.).

X-RAY

Cancer.—In the treatment of cancer, x-ray has much the same effect as radium. While it lacks the advantage of concentrated application directly to the interior of cancers, such as radium application within the uterus for uterine carcinoma, it has the advantage of wider distribution of influence. Consequently in extensive uterine cancer, deep x-ray treatment is indicated to devitalize the metastatic masses and the portions of the main growth that lie beyond the effective reach of radium applied within. In certain superficial malignant growths it effects a cure and in deap seated growths it usually exercises a marked retarding influence. Improvement in technic and effectiveness is going on rapidly, and there is substantial reason to hope for the later development of uniform curative effects even in deep seated cancers. Sarcoma is especially amenable to its influence. For the present, x-ray and radium should supplement each other—radium for concentrated local application to or within the growth, and x-ray for its widespread influence on metastases and outlying portions of the growth. The definite selection of cases for x-ray treatment is considered under cancer of the uterus and other forms of malignant disease.

Ovaries.—Under the influence of the x-ray, the ovaries gradually atrophy and lose their function. This makes it useful in cases of excessive ovarian activity as in sexual hyperesthesia (nymphomania). In addition to lessening the ovarian activity in these cases, the x-ray may be applied to the external genitals to diminish the congestion and hypersensitiveness there.

In any condition in which it is advisable to diminish ovarian activity, the x-ray is useful. By continuing the treatment long enough the patient may be rendered permanently sterile. Thus it constitutes a two-edged weapon—one that is exceedingly effective in various directions but requires much care and judgment in handling. There are cases in which sterilization, with the coincident diminution in the pelvic blood supply, would be of great benefit. While in other cases, any effect in this direction must, for various reasons, be carefully avoided.

Uterus.—The ovarian effect just mentioned tends to diminish the blood supply of the uterus and thus influences favorably nonmalignant pathological conditions in that region. Properly selected cases of myoma are generally greatly benefited by this treatment. The metrorrhagia is diminished or eliminated and in many cases there is shrinking in the size of the tumor. It is especially indicated in certain patients not in good condition for operation, where malignancy and infection and submucous myoma can be excluded. It is beneficial in selected cases of uterine bleeding from other causes such as subinvolution, myometrial hyperplasia, and chronic metritis. However, the sterilizing ovarian effect must be kept in mind, and contraindicates this treatment in most patients in the child-bearing period. The details concerning the use of x-ray in uterine myoma and in other forms of uterine hemorrhage are considered in the chapters dealing with those diseases.

External Genitals.—X-ray treatment is beneficial in tuberculosis of the vulva, in ulcus rodens, and in chronic eczema. In any chronic nonmalignant ulceration or infiltration that resists other measures, x-ray may be given a trial with prospect of cure. It has effected a cure in severe pruritus vulvae, persisting in spite of other measures. Even when the process has progressed to well marked kraurosis vulvae, this treatment as a rule gives marked relief. It is indicated, also, when the process appears in adjacent surfaces after excision of the affected labia.

The development of x-ray work generally has become so extensive that it constitutes a specialty in itself. The results depend on the accurate selection and coordination of numerous technical details, which vary greatly in different classes of cases. The best results can be secured only by one thoroughly familiar with the therapeutic use of x-ray in the various affections. The treatment is not given a fair chance when applied in a haphazard way by one familiar only with its diagnostic use. This fact should be kept in mind in every estimation of x-ray results. Again, the wise choice of treatment, x-ray or otherwise, in the various gynecologic affections mentioned, depends, of course, on a careful consideration by the gynecologist of all the methods of treatment, and the selection of the one that will best meet the conditions present in the individual case. The definite selection of cases for x-ray treatment is further considered under the various diseases.

OPERATIONS

Careful anatomic and pathologic investigations have demonstrated that many pelvic lesions are of such nature and so situated that a cure can be effected by nothing short of operative treatment, with its direct handling of the diseased tissues and extirpation of the hopelessly damaged.

In some cases this is evident from the very nature of the lesion, as in the case of malignant diseases and tumors generally. On the other hand, in many inflammatory lesions the question as to whether or not operative treatment will be necessary can be answered decisively only after Nature, with the aid of minor measures, has been given a thorough trial. The operative measures indicated in the various affections will be mentioned in the appropriate chapters.

CHAPTER IV

DISEASES OF THE EXTERNAL GENITALS AND VAGINA

POINTS IN ANATOMY

EXTERNAL GENITALS

The external genitals (Figs. 233, 234), called also the vulva and the pudenda, include the following structures:

- Mons Veneris
- Labia Majora.
- Labia Minora.
- Clitoris.
- Vestibule.
- Vulvovaginal Glands.
- Hymen.

The **mons veneris** (Figs. 3, 5, 233) is simply a pad of subcutaneous fat lying over the symphysis pubis. The triangular area which it forms is covered with hair after puberty. The base of the triangle is represented by a slight groove at the lower limit of the hypogastric region, and the lower portion is continuous with the labia majora. Examination of a microscopic section through this region shows the usual characteristics of skin, i.e., many layers of squamous epithelial cells (the deepest being cubical and the most superficial being flattened and horny) placed on loose connective tissue, and presenting hairs, sebaceous glands and sweat glands. A little deeper there is much fat, which is penetrated and held together by fibrous septa that divide it into lobules. There are also many elastic fibers.

The **labia majora** (Figs. 234, 235) are two cutaneous folds which extend one on either side, around the vaginal opening. They are apparently continuations of the mons veneris and, passing backward, end by joining the perineum. The external surface of each labium majus presents the ordinary characteristics of integument. Each labium is limited externally by the genitocrural fold and corresponds to that side of the scrotum in the male. The round ligament, coming through the inguinal canal of each side, terminates in the upper part of the labium majus of that side. Sometimes a distinct canal remains open for some distance along the round ligament. This is known as the canal of Nuck, and through it a hernia may take place into the labium, constituting a labial hernia. This is known also as a pudendal hernia. The hernial contents may be intestine or omentum or ovary or even the uterus. Occasionally the canal of Nuck is shut off from the peritoneal cavity, and the sac thus formed fills with fluid, giving rise to pudenal hydrocele or "hydrocele of the canal of Nuck." The inner surface of each labium majus is smooth and of a pinkish color. It has largely lost one of the characteristics of integument—the hairs—only a few fine hairs being found here.

In children the labia majora are very small and the labia minora project between them. As puberty is approached the external labia become larger and meet in the median line. At puberty they, in common with the mons veneris become covered with hair. A little later in life, particularly in married women, the labia minora become enlarged so much that they project forward, separating the labia majora. In old age the labia undergo marked diminution in size and prominence, the shrinking being due largely to absorption of the fat.

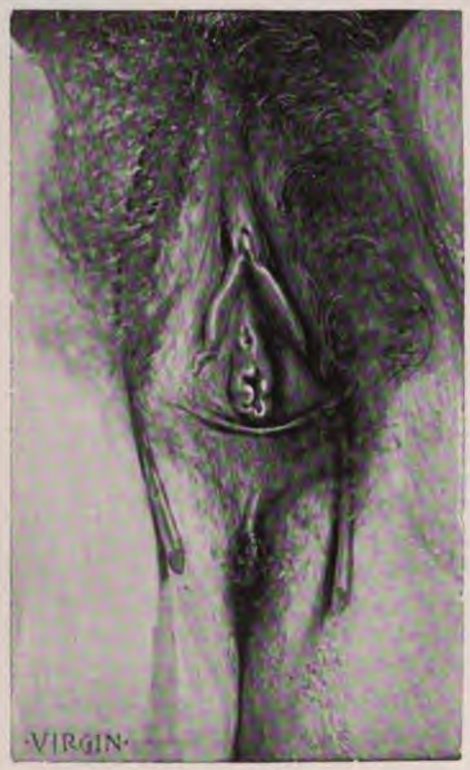


Fig. 233.—External genitals of a virgin. Photograph from a cadaver. (Dickinson—*American Textbook of Obstetrics.*)

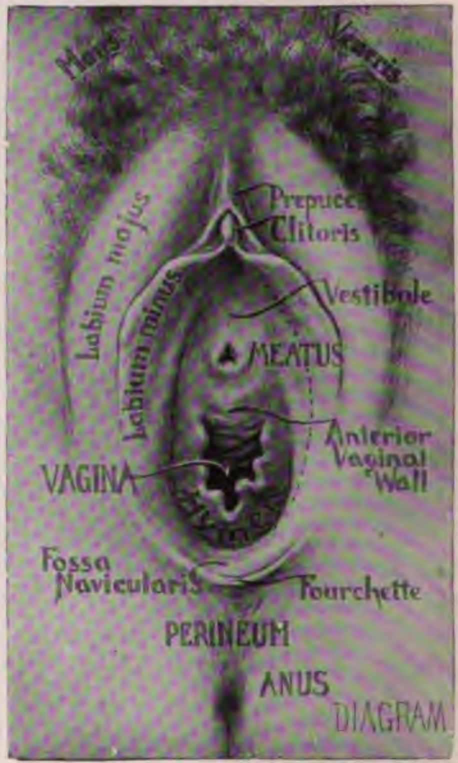


Fig. 234.—Diagrammatic representation of the external genitals of a virgin. (Dickinson—*American Textbook of Obstetrics.*)

Microscopic examination of a section of a labium majus shows the same structures found in the mons veneris, the only difference being that on the inner surface of the labium there are only a few hairs, and they are small. There are, however, many sebaceous glands. There are also, of course, the arteries, veins and other structures found in cutaneous and subcutaneous tissues. The connective tissue is rich in elastic fibers, and still deeper there is the thick deposit of fat that gives the labium its prominence. The veins are numerous and large, and become much distended when there is intrapelvic pressure, as in pregnancy or a tumor. Under such circumstances, a wound of the labium may lead to serious and even fatal hemorrhage.

The **labia minora** (Figs. 234, 235, 236), or nymphae, are two delicate mucocutaneous folds lying between the labia majora, one on each side of the vaginal opening. Each labium minus apparently grows from, or is a secondary fold of, the upper and inner portion of the labium majus of that side. In stout women the nymphae are normally concealed by the labia majora. Ordinarily, particularly in married women, they project slightly. Frequently they are somewhat enlarged and project half an inch or more. The enlargement is usually not exactly symmetrical, and in some cases it is confined to one labium. In a valuable article on these enlargements of the labia minora, Dickinson upholds the idea that whenever the enlargement is marked it is proof of excessive irritation of the labium. It is stated that among the Hottentots, owing to certain treatment practiced in childhood, the labia minora often become excessively developed and hang like a thick apron between the thighs (Fig. 330). The labia minora begin just below the anterior junction of the labia majora as double folds which pass above and below the clitoris (Fig. 234). The folds that join above the clitoris form the prepuce of the same. The labium minus of each side then descends along the inner side of the labium majus and blends with labium majus about the junc-

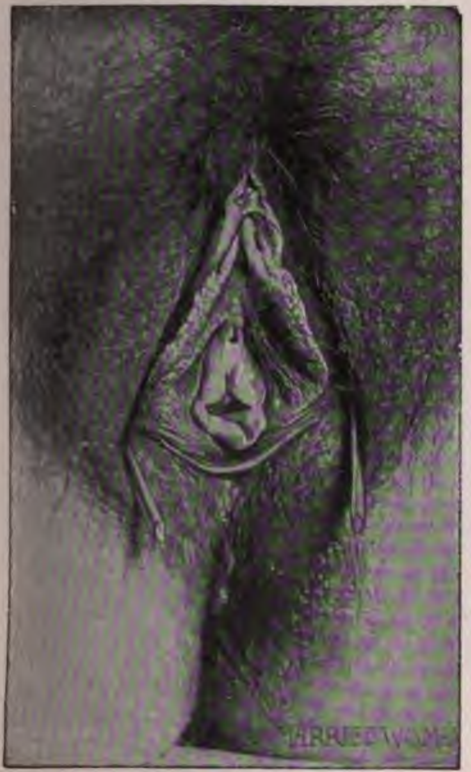


Fig. 235.—External genitals of a married woman. (Dickinson—*Am. Textbook of Obstetrics.*)

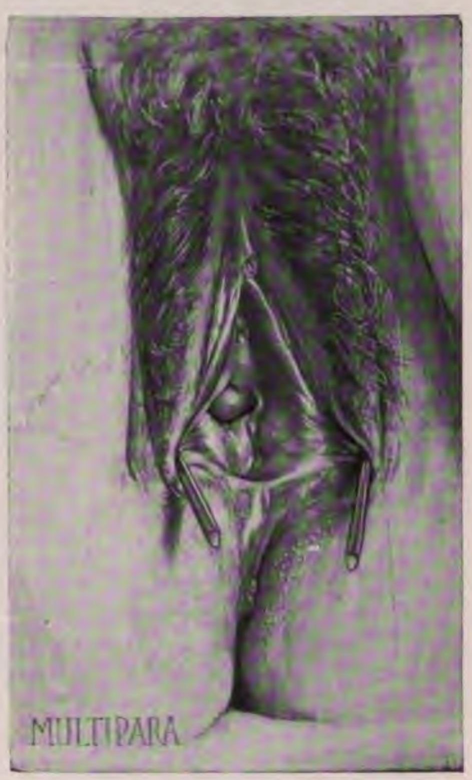


Fig. 236.—External genitals of a multipara, with slight perineal laceration. (Dickinson—*American Textbook of Obstetrics.*)

tion of the middle and lower third. The posterior extremities of the labia minora are united by a delicate fold which extends between them just within the posterior margin of the vulvar orifice, forming the fourchette. When the labia are separated, the fourchette is made tense and between it and the hymen is a small depression called, from its boat-like shape, the "fossa navicularis." This delicate fourchette is, except in rare cases, torn at childbirth, and in some cases is obliterated even by sexual intercourse. It is best seen in the virgin.

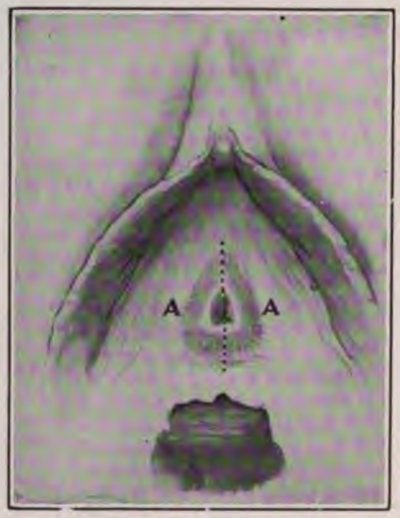


Fig. 237.—Indicating the line of division of the urethra to give the view shown in Fig. 238. (Dudley—*Practice of Gynecology*.)

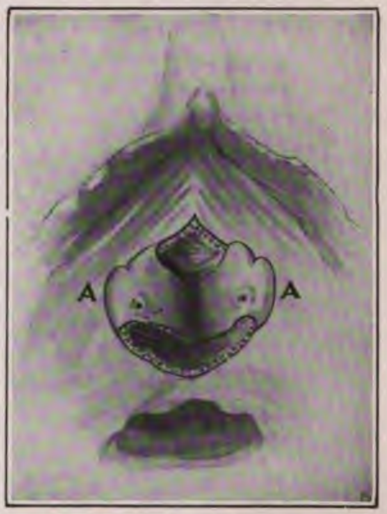


Fig. 238.—The urethra divided so as to show the openings of Skene's glands. The openings are situated just within the meatus, one on either side. (Dudley.)

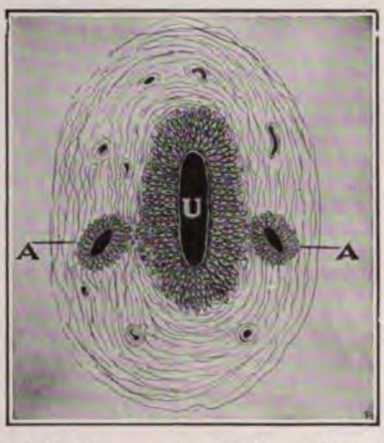


Fig. 239.—Cross section of the urethra, showing the periurethral ducts (Skene's glands). *U.* Urethra. *A.* Periurethral ducts. (Dudley—*Practice of Gynecology*.)

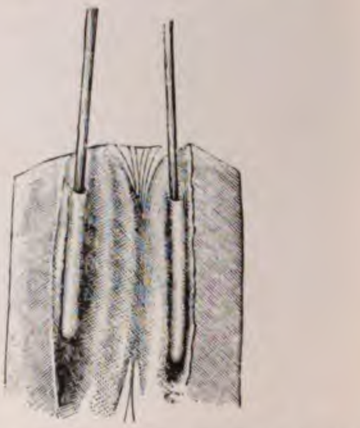


Fig. 240.—This gives a clear idea of the size and relation of the periurethral ducts (Skene's glands). The floor of the urethra has been divided longitudinally, the end of the urethra raised and a probe introduced into each of the periurethral ducts. (Skene—*Diseases of Women*.)

There has been much dispute as to whether the inner surfaces of the labia minora are covered by integument or mucous membrane. The covering presents some of the characteristics of each. It is a transitional form of covering and represents one step in the several changes which take place from the labia majora to the external surface of the cervix. The outer surfaces of the labia majora are ordinary integument. On the inner surfaces of the same structures, the hairs are much reduced in size and number. On the labia minora, the hairs are absent, though the sebaceous glands are still present. On the vestibule, only a few glands remain and the thinning of the epithelium is more marked. In the vagina, all glands disappear (it being now generally held that there are no glands in the normal vagina) and the epithelium becomes thinner and the papillae less marked. Over the vaginal portion of the cervix the papillae have almost disappeared. So there is a gradual transition from ordinary integument, with a thick epithelial layer and hairs and sebaceous glands and sweat glands and marked papillae, to a thin epithelial layer without hairs or glands and almost without papillae. When the vaginal wall is turned out for a long time, as in prolapse, and exposed to friction by the clothing, the epithelial layer becomes much thickened, and if the surface is kept dry it becomes horny like the external integument.

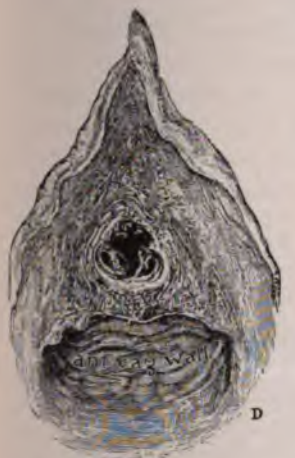


Fig. 241.—The openings of periurethral ducts show exceptionally well in this preserved specimen. (Skene—*Diseases of Women.*)

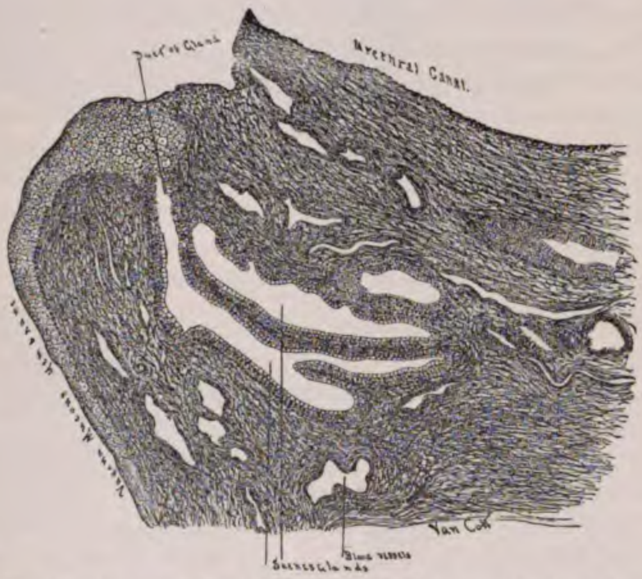


Fig. 242.—A section through the urethra showing the periurethral duct of one side, with ramifications. (Skene—*Diseases of Women.*)

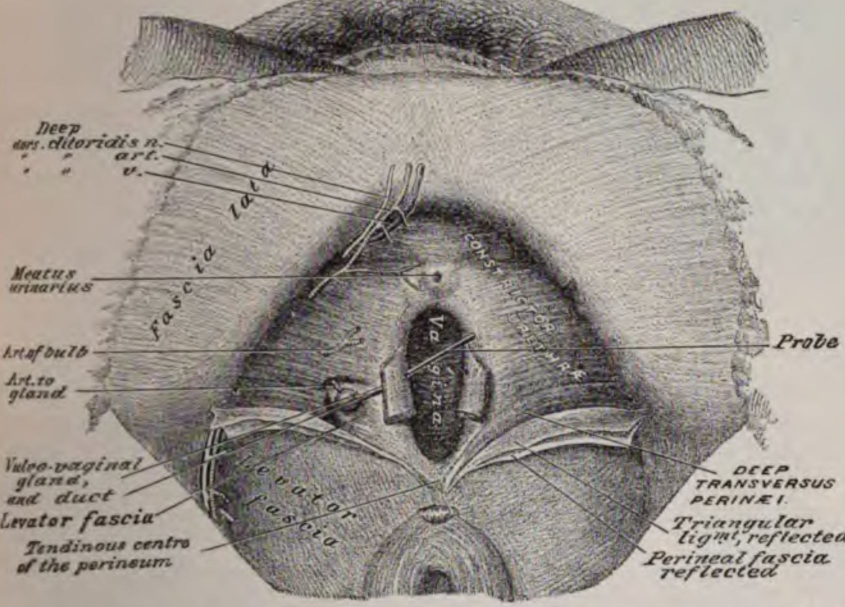
The labia minora have many small folds, giving a very uneven surface. Examination of a section of a labium minus shows numerous epithelial depressions, owing to the much folded surface. The bands and nests of epithelial cells seen in such a section are simply oblique cuts of normal folds and ingrowths. The labia minora are very rich in blood vessels, especially veins, so much so that the structure partakes of the nature of erectile tissue. They are also rich in lymphatics and nerves.

The **clitoris** (Fig. 234) is the analogue of the penis in the male, and is situated just below the anterior junction of the labia majora. It is a small erectile organ richly supplied with blood and nerves, and is attached to the sides of the pubic arch by its crura. In both the clitoris and the labia minora there are special nerve endings. Examination of a section of the clitoris shows the erectile nature of the structure. During sexual excitement the clitoris fills with blood and becomes swollen and firmer. It is supposed to be the most sensitive of all the genital organs to sexual contact, and on this account excision of the clitoris (clitoridectomy) was proposed and carried out for the relief of disturbances depending on sexual hyperesthesia, but the results were not such as to recommend the operation, and it is now rarely practiced.

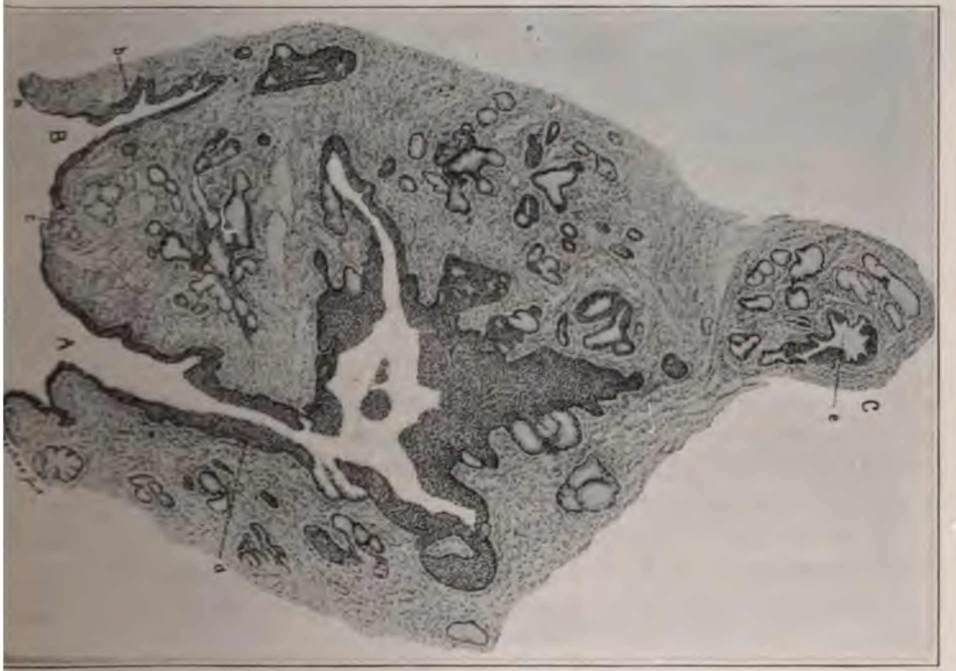
The **vestibule** (Figs. 234, 235) is an elliptical area situated between the labia minora. The sides are formed by the labia minora, the anterior end extends to the clitoris, and the posterior end is formed by the junction of the labia majora. Into this vestibule four canals open—the urethra, the vagina and the duct of the vulvovaginal gland of each side. The urethral opening, the meatus urinarius, is situated just above the vaginal orifice (Fig. 234). In the nullipara it is small and round. In the multipara it is larger and somewhat star-shaped, and there is often some pouting or projection of the urethral mucosa. This change is due to the swelling and distortion during labor, from which the parts never return absolutely to their former condition. The floor of the vestibule is formed of several layers of squamous epithelium and under this the subepithelial connective tissue. There are a few glands, some of which at times become enlarged.

The **meatus urinarius,** as well as the urethra, is lined with stratified squamous epithelium on a basis of connective tissue rich in cells. This connective tissue of the meatus and the urethra presents usually many typical lymph-nodules of microscopic size. Just within the meatus, near the posterior wall, are the openings of two diverticula, one on either side. They are known as **Skene's ducts** or Skene's glands. They are called also "periurethral ducts." Their size and shape and location are shown in Figs. 237, 238, 239, 240, 241, and 242. They are important in that gonorrheal infection may extend into them and persist there indefinitely. Just back of the lining of the vestibule there are two masses of veins, one on either side of the vaginal orifice, called the bulbs of the vestibule (Fig. 246). The bulbi vestibuli lie just in front of the anterior layer of the triangular ligament. They are supposed to correspond to the corpus spongiosum of the male. In wounds of this region, or in operations, if these vascular bulbs are injured there is troublesome bleeding.

The **vulvo-vaginal glands** are two glands situated beside the vaginal entrance, one on either side (Figs. 59, 243). They correspond to Cowper's glands in the male, though their relations to the triangular ligament is not so clearly defined, apparently varying some in different cases. They lie, as a rule, behind the anterior layer of the ligament, and may lie behind or in front of the posterior layer. Each gland lies very close to the lower end of the venous bulb of that side. The gland is a small reddish body about the size of a bean, and belongs to the racemose variety of glands (Figs. 244, 245). Its secretior



g. 243—Dissection showing the right vulvovaginal gland. A probe has been passed into the duct of the gland. (Weisse—*Practical Anatomy*.)



244.—Section of vulvovaginal gland showing duct and gland acini. Low power. (Cullen—*Jour. Am. Med. Assn.*)

is discharged through a small duct which opens just in front of the hymen, about the junction of the lower with the middle third of the side of the vaginal orifice. When the gland is normal, this opening has to be looked for rather carefully to be seen. When the gland has once become inflamed, the opening is easily seen, for it is larger and is usually surrounded by a small reddened area. The mucous secretion of the gland acts as a simple lubricant to the parts and is discharged during sexual excitement. When inflamed, the gland is felt as a hard tender mass beside the vaginal opening (Fig. 61).

The **hymen** (Figs. 234, 235, 236) is a circular or crescentic fold of mucosa and submucous connective tissue, situated at the vaginal entrance and partially closing the same (Fig. 233). The shape of the hymen and the opening in it vary much in different persons, some forms being given names. The crescentic hymen and the circular hymen are the usual forms. The fimbriated hymen has a dentated or fringe-like margin. The cribriform hymen presents a number of small holes. In certain cases of malformation, the hymen is absent. In other cases it is closed entirely (imperforate or occluded hymen—Chapter XIII).

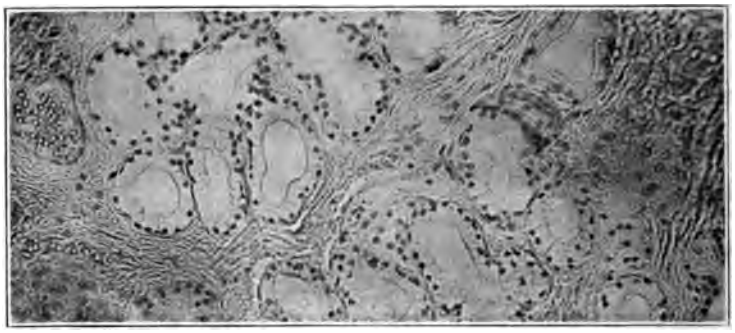


Fig. 245.—Section of gland showing acini and lining cells. High power. Gyn. Lab.

The hymen is usually ruptured at the first sexual intercourse. In some cases "rupture of the hymen" amounts to nothing more than stretching, with slight abrasion. In other cases there is distinct tearing, with considerable pain and some bleeding. In rare cases there may be persistent and even serious bleeding. In some cases the hymen is so rigid or tender as to prevent coitus. Long continued sexual intercourse stretches the hymen until it is not at all prominent. Much medico-legal importance has been attached to the condition of the hymen, and, ordinarily, it is a decided help in determining whether or not coitus has taken place. But it is a well-established fact that an intact hymen is not absolute proof of virginity, neither is an apparently ruptured or stretched hymen absolute proof of sexual intercourse.

Childbirth destroys the hymen as an intact ring. Usually after parturition there are only irregular tags of tissue left, the result of tearing and sloughing about the vaginal entrance. These irregular tags of tissue surrounding the vaginal orifice are known as "carunculae myrtiformes," r
sult from childbirth only, not from sexual intercourse. **Coitus**

usually destroy the hymen, but simply tears it slightly and stretches it.

The BLOOD SUPPLY of the external genitals (Figs. 362, 246) comes principally from the internal pudic artery, one of the terminal branches of the anterior trunk of the internal iliac.

The LYMPHATICS empty into the inguinal glands. Poirier calls attention to the fact that the lymphatics from the clitoris extend into the deep pelvic glands. Consequently in carcinoma of the clitoris proper (not its prepuce), the glands within the pelvis are soon involved.

The NERVE SUPPLY (Fig 247) comes principally from branches of the pudic and small sciatic nerves. In certain painful affections of the external genitals, the pudic nerve is sometimes divided or resected to afford relief.

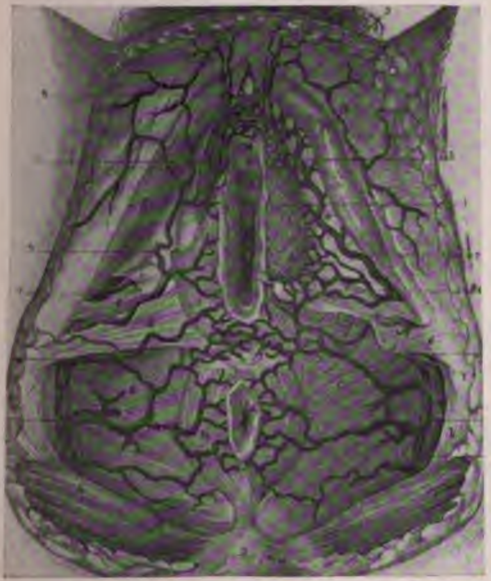


Fig. 246.—The veins of the external genitals, including the "bulb of the vestibule," on the left side. *V.* Vagina. *M.* Meatus. *I.* Left venous "bulb." (Savage—*Anatomy of Pelvic Organs.*)

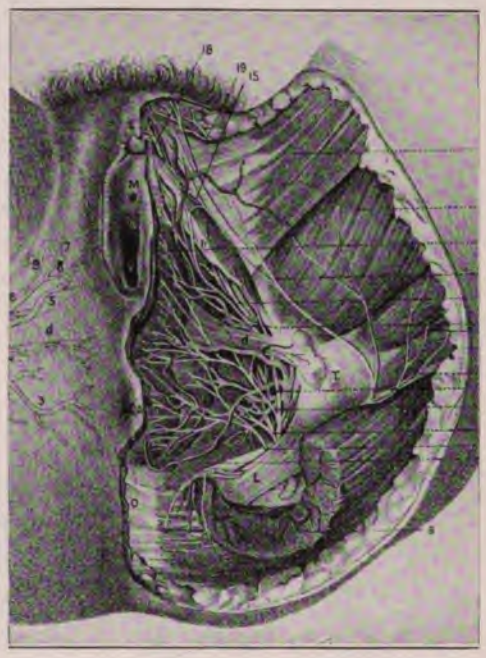


Fig. 247.—The arteries and nerves of the external genitals. (Savage—*Anatomy of Pelvic Organs.*)

VAGINA

The vagina is a musculomembranous canal extending from the vulva to the neck of the uterus, around which it is attached. It lies between the bladder and the rectum (Figs. 1, 3, 248, 249, 250).

Its **size** and **shape** are variable and it is capable of great distention, as is seen when the child passes through it in labor. The length of the vagina is ordinarily three to four inches along its anterior wall, and five to six inches along its posterior wall. It is constricted at its lower end, where it is partially closed by the hymen, and it becomes dilated towards the uterine extremity

Normally the anterior and posterior vaginal walls lie in contact, and on cross section the **cavity** is represented by a slit having somewhat the shape of the letter H (Fig. 250). The wide diameter of the vagina, some distance up the canal, is the transverse diameter, but the wide diameter of the vulvar cleft is the antero-posterior diameter. Furthermore, the anterior end of the vagina lies so far up in the narrow part of the pubic arch (in patients where the perineum has not been damaged) that there is not much room laterally. Consequently in introducing the speculum, the preferable way is to introduce one finger into the vaginal opening and press the perineum well back (Fig. 131), so that the vaginal opening is stretched anteroposteriorly and made to correspond in a measure with the vulvar cleft, and then introduce the speculum obliquely as shown in Fig. 132. When the speculum is well past the entrance, so that it may be used to depress the perineum, it is then turned with its width in the transverse diameter of the vaginal canal (Fig. 133) and introduced all the way. From the author's experience, this is decidedly the preferable way of introducing the speculum, when the perineum is intact and resisting. He considers erroneous the statement by some authorities that the speculum should be introduced with the wide diameter transversely, "because the wide diameter of the vaginal canal is transverse." The speculum must first pass the vulvar cleft and vaginal entrance, and we must deal with the conditions found there before accommodating the speculum to the wide diameter of the canal proper. Of course, in a large proportion of cases the perineum is lax from damage and the primary anatomic relati

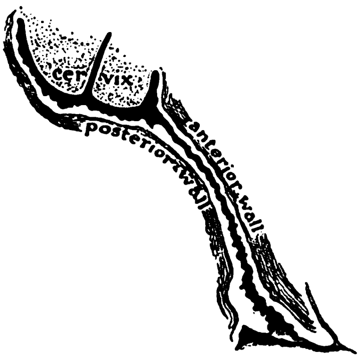


Fig. 248.

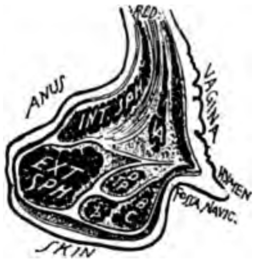


Fig. 249.

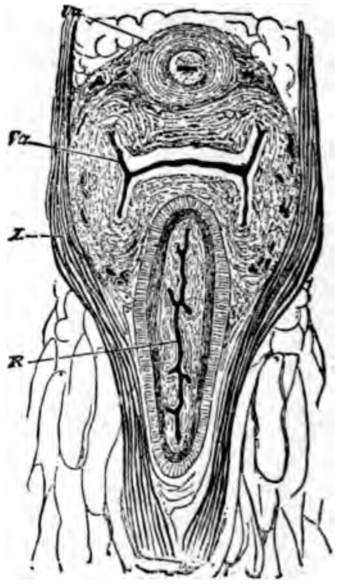


Fig. 250.

Fig. 248.—Longitudinal section of vagina. (Skene—*Diseases of Women.*)

Fig. 249.—Section of perineum, showing shape and structure. (Skene—*Diseases of Women.*)

Fig. 250.—Cross-section of the pelvic structures, showing the relations of the urethra, vagina, rectum and levator ani muscles. Notice how the vaginal walls fold so that the shape of the cavity approximates the letter H. *Ur.* Urethra. *Va.* Vagina. *R.* Rectum. *L.* Levator ani muscle. (Savage—*Anatomy of Pelvic Organs.*)

destroyed, and the speculum may be introduced in any way without resistance.

Relations.—Fig. 1 shows the angle which the axis of the uterus normally bears to the axis of the vagina. The upper end of the vagina surrounds the lower end of the uterus. That portion of the cervix uteri projecting into the vagina is known as the vaginal portion (portio vaginalis). The attachment of the vagina extends higher on the posterior wall of the cervix than on the anterior. The vaginal mucosa is continued on the cervix as far as the external os.

The upper end of the vagina is termed the "vaginal vault." The term "fornix" is also much used, the anterior fornix being that portion of the vault in front of the cervix, and the posterior fornix being that portion lying behind the cervix, and the right and left lateral fornix lying to the right and left respectively. With the uterus in normal position, the posterior fornix is much deeper than the anterior, for the vaginal wall is attached higher on the posterior surface of the cervix than on the anterior.

The vagina is surrounded by important structures. The anterior wall is in contact with the urethra and the base of the bladder (Fig. 1). The vaginal wall and bladder wall and the tissue lying between them, constitute the vesicovaginal septum. The posterior wall for the lower three-fourths of its extent is attached to the anterior wall of the rectum, except the very lowest portion, which is separated from the rectal wall by the perineum. The vaginal and rectal walls and the tissue lying between them, constitute the rectovaginal septum. The upper fourth of the posterior wall is separated from the rectum by the recto-uterine pouch of peritoneum, known as the "culdesac of Douglas" (Figs. 3 and 4). The sides of the vagina give attachment to fibers from the levator ani muscles and the recto-vesical fascia.

Structure.—The wall of the vagina presents three layers—an external connective tissue layer, a middle muscular layer and an inner mucous layer. The CONNECTIVE TISSUE layer serves to attach the vagina to the adjacent organs. It contains the external plexus of veins, and is composed of connective tissue filled with lymphatics and blood vessels, the veins being especially numerous. The attachment of the vagina anteriorly is firm in the lower third where it is attached to the urethra. It is more loosely attached to the bladder in the middle and upper third, particularly the latter, and is easily separated in operating.

The MUSCULAR LAYER contains involuntary muscle fibers arranged in bundles without distinct strata. Some of the bundles are longitudinal, some transverse and some oblique. The muscular layer is thicker at the lower than at the upper end.

The MUCOUS LAYER, or the lining of the vagina, is apparently a modified epidermis. It presents on the surface the usual layer of squamous epithelium several cells thick and, beneath this, connective tissue rich in cells (Fig. 251). The glands have all disappeared and the papillae are much smaller than are encountered in the external genitals. The vagina normally contains no glands. The secretion found in the vagina comes from the cervix and the endometrium, principally the former. The vaginal walls are kept constantly moist with the secretion, and consequently the epithelium desquamates before it advances so far in the process of cornification as is seen in integument. In cases of prolapse, where the vagina is turned outside the vulva and is subjected to friction of the clothing and is kept dry by contact with them, it becomes more like ordinary epidermis and shows well-marked keratin changes. The mucosa (epithelium and connective tissue immediately under it) is attached to the muscular coat by a submucous layer of loose connective tissue which is very rich in interlacing veins, about some of which are bundles of muscular fibers, forming a kind of cavernous tissue.

The vaginal mucosa is thrown into numerous large folds called "rugae" (Fig. 248). Extending longitudinally along both the anterior and the posterior wall of the vagina is a prominent ridge, best marked in the virgin. These ridges are known as the "columns" of the vagina, and from them the rugae extend laterally. The columns and rugae become more or less obliterated by childbirth, so that in many multiparae the vaginal walls are almost smooth.

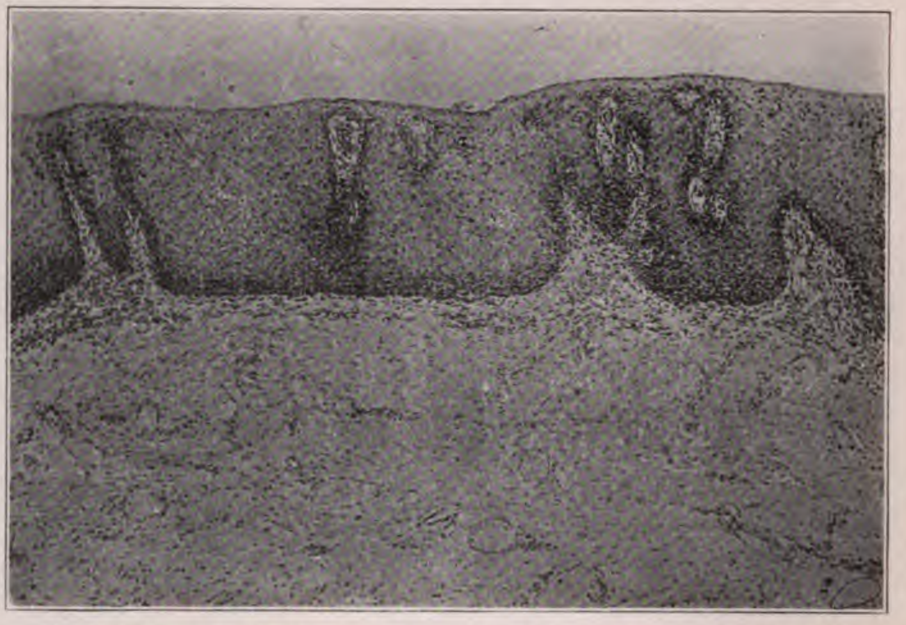


Fig. 251.—Vaginal wall, microscopic section. Notice the absence of glands. Gyn. Lab.

Vessels and Nerves.—The blood supply of the vagina comes from the anterior trunk of the internal iliac, through the vaginal, uterine, middle hemorrhoidal and internal pubic arteries. These anastomose freely in the vaginal wall. The veins of the vagina are arranged principally in two plexus that form complete vascular sheaths around the canal. One plexus is external to the muscular layer, while the other lies just beneath the mucosa. These veins form an intricate network and communicate freely with the plexus of the other organs and with the plexus of the broad ligament.

The lymphatics from the lower third of the vagina, it is generally held, join those from the external genitals and empty into the inguinal glands.

But Poirier, who has made a special study of the subject, claims that all the lymphatics of the vagina empty into the pelvic glands and that when an injection of the vaginal lymphatics is made, even just within the hymen, no injection material passes to the inguinal glands except through some anastomosing channels. The lymphatics from the middle third of the vagina empty into the hypogastric glands. Those from the upper third join with the lymphatics of the cervix uteri and pass to the iliac glands.

The NERVE SUPPLY of the vagina comes from pelvic plexus of each side.

CLASSIFICATION OF DISEASES

Of the External Genitals and Vagina

GONORRHEA.

OTHER INFLAMMATORY DISEASES OF THE VULVA—Simple Vulvitis, Follicular Vulvitis, Erysipelas, Cellulitis, Gangrene, Diphtheria, Eczema Intertrigo, Herpes, Prurigo, Parasitic Diseases.

OTHER INFLAMMATORY DISEASES OF THE VAGINA—Simple Vaginitis, Trichomonas Vaginitis, Parasitic Vaginitis, Diphtheritic Vaginitis, Emphysematous Vaginitis, Adhesive Vaginitis.

ULCERS OF VULVA AND VAGINA—Simple Ulcer, Chancroid, Syphilis, Tuberculosis, Granuloma Inguinale, Malignant Disease, Ulcus Rodens Vulvae.

URETHRAL AFFECTIONS—Urethritis, Periurethal Abscess, Prolapse of Urethral Mucosa, Urethral Caruncle.

VULVOVAGINAL GLAND AFFECTIONS—Inflammation, Abscess, Sinus, Cyst, Tumor.

NONMALIGNANT GROWTHS AND SWELLINGS—Condylomata, Stasis Hypertrophy and Elephantiasis, Adenomyoma, Fibroma, Lipoma, Cysts, Pudendal Hernia, Pudendal Hydrocele, Hematoma, Varicose Veins.

INJURIES OF VULVA AND VAGINA.

MISCELLANEOUS AFFECTIONS—Kraurosis Vulvae, Pruritus Vulvae, Hyperesthesia of Vaginal Entrance, Adhesions of Prepuce and Labia.

(The more pronounced Malformations are considered in Chapter XIII.)

GONORRHEA

Gonorrhea is inflammation of the genital organs produced by the gonococcus. The term, when not qualified, is understood to mean gonorrheal inflammation of the vulva, vagina and urethra, i.e., gonorrheal vulvitus, vaginitis and urethritis. If the process extends into the uterus or fallopian tubes or bladder, it causes complications known respectively as gonorrheal endometritis, gonorrheal salpingitis and gonorrheal cystitis. Gonorrhea is sometimes referred to as "specific" vaginitis or vulvitis or urethritis.

ETIOLOGY

Gonorrhea is caused by contact of the affected organs with a gonorrheal discharge, usually in sexual intercourse. The infecting germ (the gonococcus) is a diplococcus, easily stained, and is found in large numbers in the pus cells of all acute gonorrheal discharges (Fig. 252). In chronic gonorrheal discharges it is not found so abundantly—in fact, in some cases, it is so scarce as to be very hard to find, and may even disappear entirely for a time.

All discharges containing the gonococcus are capable of causing gonorrhea. The slight urethral discharge from a chronic deep urethritis or from a stricture, persisting months or years after an attack of gonorrhea in the male, is very liable to cause gonorrhea when brought in contact with virgin soil.

A sad exemplification of this fact is seen in the many instances in which a bride is infected by her husband, who had gonorrhea years before but supposed himself well. The consequence of such infection is that, instead of a healthy, happy woman with sons and daughters, the wife becomes a confirmed invalid in a childless home. This danger is not sufficiently appreciated by men generally—in fact, the man usually does not know the danger until too late. The responsibility of physicians in this matter is great, for the physician must decide when a man who has had gonorrhea may safely marry.

The report of the special committee appointed by the American Medical Association to consider this question, is worthy of study (Journal A. M. A. March 30, 1901). The committee was appointed to determine whether a man who has had gonorrhea may ever safely marry, and, if so, when? Careful inquiries were made and replies were received from the leading teachers of genitourinary surgery in this country and in Europe.

Among the questions asked were the following, concerning, of course, gonorrhea in the male:

1. Is gonorrhea curable—so curable that the physician can confidently say to his patient, "You may marry now; you run no risk of infecting your wife"?

2. Upon what tests do you rely in order to determine positively whether the patient is wholly free from the gonococcus and is not infectious?

3. What period of time should elapse after the disappearance of the last evidence of the gonococcus before the patient should be permitted to marry?

The following fairly represents the concensus of opinion of the authorities quoted in that report:

1. CURABILITY.—Gonorrhea is curable with the following exceptions:

a. Gonorrhea is not curable in the sense that the physician can guarantee that no infection will result therefrom, but so that in good conscience he can give an assurance that, in all human probability, no infection will result.

b. There are a few cases (estimated by one authority as about 3 per cent) which, on account of an especially deep-seated lesion or serious complications, are incurable. These patients can never safely marry.

2. DETERMINATION OF CURE.—All agree that the examination must be thorough and repeated, and that only on the basis of repeated negative examinations, conducted over a considerable period of time, should the conclusion be reached that the patient is no longer infectious.

The following points are insisted on:

- a. Absence of the gonococcus.
- b. Absence of pus germs.
- c. Absence of pus cells.

It is pointed out that the ordinary pus germs may cause trouble, and that cases have occurred in which the husband carried to the wife a pyogenic infection causing serious pelvic disease, though the gonococcus had entirely disappeared and did not reappear in either husband or wife.

3. TIME LIMIT.—The period of time which should elapse after the disappearance of the last evidence of the gonococcus before the patient should be permitted to marry, is given by several authorities as one year. Others state three months to a year, depending on the circumstances of the case.

Though the usual cause of gonorrhea is sexual contact with an infected person, it may exceptionally be caused by other means, as by contact with an infected towel or douche nozzle or chamber utensil or closet-seat.

PATHOLOGY

In the adult, the thick epithelial lining of the vestibule and vagina is resistant to the gonococcus, somewhat like the external skin surface though to a less degree. But the gonococcus flourishes on the thin delicate mucous membrane of the urethra and vulvovaginal glands and cervix uteri. The discharge from these foci irritate the vaginal and vulvar surfaces causing considerable vaginitis and vulvitis which, however, subsides within a short time.

Ordinarily the gonococcus does not penetrate deeply and spread by way of the lymphatics, as does the streptococcus and the staphylococcus, but remains among the epithelial cells and spreads along the mucous surface.

There is at first abnormal dryness of the parts, then a slight secretion, which rapidly increases in a day or two and, when the inflammation is well established, it becomes a free yellow discharge, causing much irritation of the adjacent surfaces. There is the ordinary serous and cellular infiltration into the involved areas. The most superficial layers of the epithelium are thrown off and the gonococci penetrate the underlying tissues to a greater or less extent, depending on the severity and duration of the inflammation. There may be, later, a mixed infection, one or more of the ordinary pus germs being found with the gonococcus. Usually only the meatus or lower third of the urethra is involved, hence the urinary symptoms in women are usually mild and of short duration, unless carried higher by too active treatment or by catheterization. Skene's glands, or ducts, in the urethra are likely to be penetrated and there the process may remain indefinitely.

In children the process is usually limited to the vulva and urethra, for the reason that the penetration of the vagina by the infection carrier rarely takes place.

In the adult gonorrheal inflammation is very liable to extend into one or both of the vulvovaginal glands or into the cervix uteri and to remain active there after all other symptoms have disappeared.

In the cervix upward extension is often limited for a long time by the internal os. During or following menstruation is the usual time for extension upward, causing acute endometritis, (see Chapter VI) and perhaps later acute salpingitis (see Chapter X).

Though extension superficially along the mucosa is a striking characteristic of the gonococcus, it does penetrate deeply at times and may be carried to distant parts. The occurrence of gonorrheal joint troubles and gonorrheal endocarditis show the penetrating power of the germ and indicate the serious complications that may come from the infection. In addition, it opens the way for invasion by other bacteria and all in all is a common cause of distant "focal" infections.

In reinfection in adults the process is comparatively mild and is usually limited to certain areas, for example, the urethra or the cervix.

SYMPTOMS

Within a few days after suspicious coitus the patient complains of slight irritation about the genitals. The parts feel dry and uncomfortable, and there may be a slight burning sensation. The feeling of discomfort increases and a discharge appears. About the same time or a little later, there is noticed a smarting or burning on urination and increased frequency of urination. Within two or three days of the beginning of the trouble the discharge is profuse and the signs of irritation (burning and itching and frequent painful urination) are marked.

On inspection, the structures immediately surrounding the vaginal orifice are found reddened and painful on pressure. There is a yellow discharge from the vagina and frequently some discharge from the urethra. Acute gonorrheal discharge leaves a yellow stain where it dries on the clothing.

On digital examination, the vaginal walls are found rough and hot and tender. Pressure on the anterior vaginal wall directed from the upper end of the urethra to the meatus, will bring to view one or more drops of urethral pus (Figs. 57, 58). If the case has passed beyond the acute stage, the pain and discomfort are not so marked, but the discharge, more or less profuse, is still present.

DIAGNOSIS

Gonorrhea must be distinguished from vulvitis and vaginitis due to various other causes.

The distinguishing characteristics of gonorrhea are as follows:

1. **Rapidity of Development and Severity of Symptoms.**—The inflammation with its accompanying symptoms usually reaches its height within the first week and then begins to subside. As a rule with but few exceptions, other inflammations of the vagina are not so severe or the discharge so profuse. Occasionally there occur instances of very mild gonorrheal infection. This mild reaction to the gonococcus is found almost exclusively in tissues that have suffered previous gonorrheal infection or that have become somewhat hardened by frequent child-bearing.

2. **Involvement of the Urethra and Vulvovaginal Glands or Ducts.**—These extensions of the inflammatory process are rare in ordinary pus infection. In fact the involvement of the meatus and of the openings of the ducts of the vulvovaginal glands is so constant in gonorrhea and so infrequent in other forms of inflammation, that some authors hold that it can be determined whether or not a patient has ever had gonorrhea by determining the presence or absence of evidence of previous inflammation of the structures just mentioned. Such evidences are a reddish margin around the meatus, with rolling outward and chronic congestion of the urethral mucous membrane, and a bright red spot marking the orifice of the vulvovaginal gland of each side (so-called "gonorrheal maculae"), and sometimes pressure on the gland will cause pus to appear at the opening of the duct (Fig. 60). Though such inflammation is usually caused by gonorrhea, it occasionally occurs from other causes, and consequently is not an absolute indication of previous gonorrhea.

3. **No Other Apparent Cause for the Inflammation.**—Vaginitis other than gonorrheal presents some cause for its existence, for example, pus infection following labor or abortion, the use of an infected douche nozzle or the development of that local nutritive change which causes senile vaginitis.

4. **Development Within a Few Days After Sexual Intercourse.**—Considerable pain from slight traumatism and some bladder disturbance may follow coitus, particularly in the newly married, but such cases do not present the profuse yellow discharge of gonorrhea.

5. **Presence of the Gonococcus.**—The presence of the gonococcus is determined by microscopic examination of the pus from the infected areas. With the tip of the applicator take a small amount of the urethral discharge and spread it in a thin film on two glass slides, or on cover-glasses if preferred. If using cover-glasses, spread four or five with the urethral pus, for some may get broken. If desired, specimens of pus may be taken from other localities also, for example, from the ducts of the vulvovaginal glands or from the cervix, the specimens from the different localities being designated by the initial letter of the name of the locality, e.g., *u* (uretha), *c* (cervix), *v.v.* (vulvovaginal gland).

Staining the Gonococcus

Smears should be made from secretion from the urethra or from the vulvovaginal glands or from the cervix. The secretion is spread upon the slide in a thin film, allowed to dry and then passed two or three times through the flame.

It is then stained by flooding for 15 seconds with a weak solution of any of the commonly used aniline dyes, preferably a 1 per cent solution of methylene blue. It is then rinsed with water, the excess of which is removed by gently blotting with filter paper. After the slide is thoroughly dry, it is examined by means of the 1/12th oil immersion lens. A cover glass is not needed.

The gonococcus takes the stain very eagerly, so that this organism appears very dark in comparison to the cell nuclei and even other bacteria.

The characteristic appearance of the smear is shown in Fig. 252. Large numbers of roll-shaped diplococci (Fig. 253) are seen within the pus cells. Such a typical picture hardly requires any further confirmation.

In chronic cases, however, this picture is not usual. There may be only a few organisms and of these only one or several pairs may be found within the cells. In that case, the diagnosis cannot be made positively, since other organisms found in the vagina may give the same picture. Since many, if not most, of these organisms are Gram-positive, staining by Gram's method will help clear the doubt. The diplococcus catarrhalis, however, which is found in the vagina occasionally, cannot be thus distinguished, since it is an intracellular organism and is Gram-negative. In doubtful cases it may be necessary to differentiate these organisms by cultural methods.

Tiedemann's Modification of Gram's Stain.—A thin smear is dried without heat and flooded with a 2 per cent solution of crystal violet (Hoechst) in methyl (wood) alcohol. The stain is allowed to act for 15 seconds and is then removed by allowing distilled water to drop slowly from a burette onto the slide for 15 seconds. It is then washed briskly with distilled water.

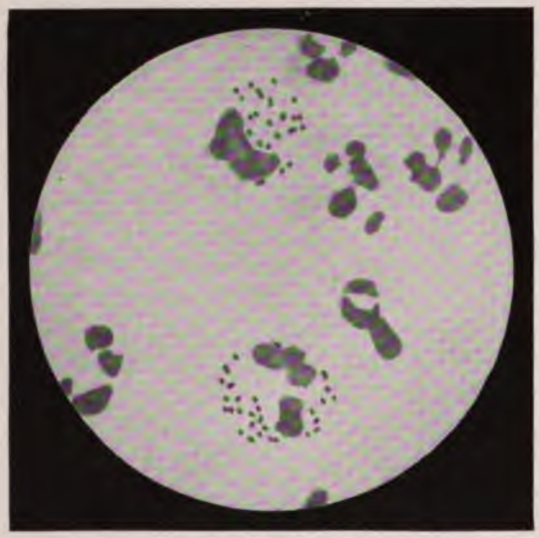


Fig. 252.—Specimen of pus from a case of gonorrhea, stained with methylene-blue. This field contains two gonococcus-colonies, each within a pus cell. Only the nuclei of the pus cells are seen. The lower colony has the circular outline of the cell containing it. (Kolle and Wassermann—*Handbuch der Pathogenen Mikroorganismen.*)

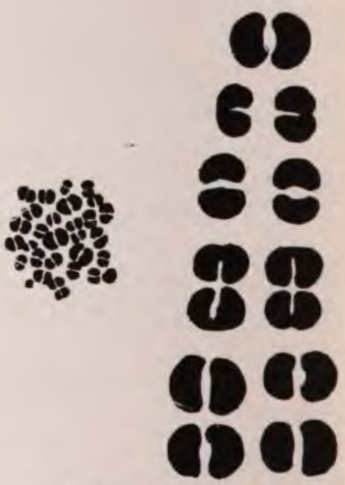


Fig. 253.—Indicating the shape of the diplococcus of gonorrhea (gonococcus). (Byford—*Manual of Gynecology.*)

The slide is now flooded for 15 seconds with a solution containing 1 gram of iodine and 2 grams of potassium iodide to 100 c.c. of distilled water. This solution is poured off and the slide flooded with 95 per cent alcohol until no more color is given off. This takes about 10 seconds. The slide is then washed with water and dried. It is advisable to counterstain very lightly with a solution of carbol-fuchsin diluted with ten times its volume of water. Gram-positive bacteria appear bluish black, while Gram-negative bacteria, if counterstained, appear a pale red.

Significance of the Microscopic Findings

In a few cases, diplococci showing the staining qualities of gonococci have been found in patients where apparently there has never been gonorrhea. Both such cases are exceptional and only serve to show that the positive diagnosis of gonorrhea must rest on the clinical symptoms and microscopic findings together, and not on the microscopic findings alone.

As already stated, in **acute** and subacute cases there is rarely any difficulty in determining certainly whether the trouble is or is not gonorrheal.

In **chronic** cases, on the other hand, there is often great difficulty. If a few apparent gonococci (shape, groupings, situated in pus cells, decolorized by Gram's method) are found, the diagnosis is not positive (may be "pseudo-gonococci"), though the strong probability is that the lesion is gonorrheal, if the history and ordinary examination findings point that way. The employment of culture methods by a skilled pathologist may be necessary to differentiate between the gonococcus and the diplococcus catarrhalis.

If no apparent gonococci are found in a chronic discharge, that is not proof that the lesion is not gonorrheal. In many cases of chronic discharge from lesions that are undoubtedly gonorrheal, no gonococci are found, because they have temporarily disappeared from the secretion. But they lie hidden in the tissues from which the discharge comes and are still capable of causing infection, and they are likely to be excited to activity by anything that causes pelvic congestion, as, for example, sexual intercourse or an attack of pelvic inflammation.

Thus it is seen that the presence or absence of apparent gonococci falls short of decisive import in a considerable proportion of cases of chronic discharge.

Diagnosis in Doubtful Chronic Cases

In the doubtful chronic cases, just referred to, an approximately correct diagnosis may be made by giving attention to the following points:

1. Careful consideration of the clinical history as pointing to previous gonorrhea or excluding the same. In this connection, it must be borne in mind that in the adult married woman, particularly after the vagina has been toughened by child-bearing, gonorrhea may produce but slight inflammation of the vagina, and hence might be missed entirely in the history. A point against gonorrhea is that the inflammatory trouble was apparently caused by infection following labor or abortion or by instrumentation or by some other sufficient cause aside from coitus. Remember, however, that an old gonorrhea may be stirred up by labor or abortion. From a chronically inflamed vulvovaginal gland or cervix uteri, the infection may spread upward into the body of the uterus and there set up a puerperal gonorrheal endometritis. This may be the first decided intimation the patient has of her gonorrheal infection. The discharge from such a fresh focus usually shows undoubted gonococci in abundance, if the patient happens to be seen at that time.

2. Evidence of inflammation of the urethra or of the duct of one or both vulvovaginal glands.

3. The presence in the discharge of a germ presenting the characteristics of the gonococcus. In a patient who has once had gonorrhea, the presence in the discharge of such a germ is strong presumptive evidence that the gonorrheal process is still active.

4. Effect of treatment. A chronic inflammatory trouble due to the gonococcus is usually more resistant to treatment than when due to other causes.

5. Tubal complications. Chronic salpingitis is much more frequent and persistent in gonorrheal than in other forms of endometritis. Also, it is more frequently bilateral.

6. Sterility. Persistent sterility is one of the marked characteristics of gonorrheal inflammation, much more so than of the ordinary pyogenic infection.

7. History of gonorrhea in the husband. This fact, if established, would of course help much in the diagnosis in a doubtful case. In such a case the husband should be seen and questioned. As a rule no question on this point should be asked the wife, as it might arouse suspicion in her mind, and cause domestic trouble that would bring more unhappiness than the pelvic disease.

8. Complement-fixation test, if distinctly positive, especially the Smith modification. In this modification cervical secretion or secretion from other area of infection is used instead of blood (see Chapter I).

TREATMENT

The treatment of acute gonorrhea in women, like the treatment of the same disease in men, has been the subject of much experimentation and of many different conclusions. The treatment employed by different authorities varies all the way from the most active and radical interference to practically no treatment beyond some external cleansing.

Before stating in detail the methods, it will be desirable to describe clearly the principal purposes of the treatment. They are as follows:

a. **To Prevent Extension Upward** of the disease to the endometrium and fallopian tubes. The extension to the fallopian tubes is a most serious result of gonorrheal infection and condemns a large proportion of the victims to chronic invalidism or to a serious operation. In either case, there will probably be sterility.

b. **To Completely Eradicate the Infection** from the lower genital tract so that no infective discharge will remain. As long as one spot of gonorrheal inflammation remains in the vagina, in the vulvovaginal glands, in the urethra, or in the uterus, the discharge is infective and is a source of danger to the patient and to those around her. At any time, there may be an extension upward to the tubes or there may be infection of the eyes of the patient or of someone else in the household. It is probable that a considerable number of the cases of gonorrheal vulvitis in children come from accidental infection from a contaminated towel or closet-seat, in the home or elsewhere.

c. **To Relieve the Discomfort** attendant on the inflammation and to prevent contamination of the patient's clothing and surrounding objects with the discharge.

Details of Treatment

It must be recognized at the start that the principal influences preventing extension upward of gonorrhea, are the resistance of the tissues and the barriers (constrictions, cervical mucus) placed in the canal by nature for the purpose of protecting the deeper organs.

The strength of this natural resistance to the spread of the disease varies much in different persons. In some cases the gonorrhea is well limited, extending upward not at all or only by short steps at long intervals. In other cases it runs a rapid course from the external genitals to the inmost recesses of the genital canal. This marked variability in the course of the disease is easily demonstrated by closely questioning patients who give a history of gonorrhea some months or years before. The favorite time for extension to the endometrium and fallopian tubes, is during the last day or two of menstruation and the first few days following menstruation.

No measure of treatment should be employed that interferes with the natural protective influences. One point of particular importance, is to be very careful not to carry the infection any further than it has already extended. For example, the examination and treatment should be confined to the inflamed vulvar surfaces alone, unless there is positive evidence (such as a profuse discharge) that the trouble has extended past the vaginal entrance. Likewise in vaginal gonorrhea, no treatment or examination should extend past the external os of the cervix uteri, unless there is unmistakable evidence that the gonorrhea has extended into the cervical canal.

A second important point is to use no application or instrumentation that will injuriously irritate the surfaces. Though such a strong irritating antiseptic application may kill most of the gonococci on the surface, it causes no such desquamation and irritation of the surface that it favors multiplication and penetration by the remaining gonococci and tends to cause, rather than prevent, extension of the process, both into the tissues and upward along the surface.

On the other hand, when no treatment is employed, the accumulating irritating discharge and vast colonies of bacteria in the affected canal, cause marked irritation, and favor extension deeper into the tissues and upward along the canal.

The best results are achieved in most acute and subacute cases by a program about as follows:

1. **Office Applications.**—If inspection shows that the process is apparently confined to the vulva (including meatus urinarius, and ducts of the vulvovaginal glands) be very careful not to carry the examining finger or the applicator or other instrument past the hymen or hymen remnants. Having secured the required specimen for microscopic examination, the parts are cleansed and the affected surfaces painted over with a 25 per cent solution

of argyrol or a 2 per cent to 5 per cent solution of protargol. The application is made with a small cotton ball (the size of a bean) caught in the end of the dressing forceps and dipped into a small amount of the solution poured out into a medicine glass. Or a cotton-wrapped applicator may be used. Silver nitrate solution (1 per cent to 5 per cent) does very well, but is rather painful, and the discoloration it causes on the clothing and fingers is not removed by washing.

After a free application of the medicine has been made, the surfaces are dried and some drying antiseptic powder dusted on. The author uses xeroform and boric acid (1 to 3) and finds it very satisfactory, and without the odor that attaches to iodoform. Most any nonirritating antiseptic powder will answer the purpose. If it is found that the patient experiences more smarting and burning after this drying of the surface, the powder may be left off the next time. A large piece of absorbent cotton is applied to cover the vulva, the inner portion being so disposed as to lie between the inflamed surfaces, to keep them apart and absorb the discharge. The cotton is held in place by a T-bandage.

If the examination shows that the process has extended up into the vagina and the tenderness has subsided so that the speculum may be used without pain, the speculum is introduced and the affected areas (usually, in the primary acute attack, the entire vaginal wall and the cervix) are painted with the 25 per cent argyrol or one of the other solutions above mentioned. The vagina is then dried and the nonirritating antiseptic powder dusted in. The vulva is treated in the same way and covered with absorbent cotton, as above described.

2. **Prescriptions.**—Give the patient a prescription for a concentrated antiseptic solution for making up an antiseptic wash or douche solution as required. The lysol douche does very well or, if preferred, the permanganate douche may be used (see douche, Chapter III).

If the patient is nervous and sleepless and upset by the trouble, give a prescription for some sedative solution, such as the sodium bromide solution with instructions to take at 8 and 10 P.M. and 8 A.M., and repeat after three hours, when very restless. If the patient is not very nervous, but complains of marked bladder irritability (frequent painful urination) a hyoscyamus and potassium citrate mixture may be preferable to bromide. If there is neither marked bladder irritability nor decided nervous disturbance requiring a prescription, it is well to give some urinary antiseptic such as hexamethylamin which tends to prevent extension of the trouble along the urethra and tends to allay discomfort there.

3. **Instructions.**—Give the patient the following instructions:

a. On reaching home, lie down and stay in bed practically all the time, as long as there are any acute symptoms (pain, burning, bladder irritability). It is especially important to be quiet in bed during menstruation and for some days afterward.

b. Keep the bowels well open every day, as that tends to diminish the pelvic congestion. Free bowel movements should be secured by internal laxatives. No enema is permissible, ordinarily, because of the danger of carrying the infection into the rectum. For the same reason, rectal suppositories should not be used.

c. Keep the parts covered with a large piece of absorbent cotton, held in place by a bandage or napkin such as is used during menstruation. As often as the inner surface of the cotton is soiled, it should be removed and a fresh piece applied. This removes the discharge from the inflamed surfaces and prevents the irritation that would result from its accumulation there. More important still, it prevents general contamination of the clothing and hands and other surfaces by the infective discharge. Each time the patient changes the dressing, she should immediately cleanse her hands.

In explaining to the patient the necessity of keeping the infected surfaces covered with cotton, and of changing the cotton often and of washing the hands well afterward each time, take particular care to **arouse no suspicion** that might lead to domestic infelicity.

Your work is to lessen suffering, not to cause it. If the patient should become apprised of the fact that her husband has been untrue to her and in addition has brought to her a loathsome disease, her suffering would be far greater than any physical distress that might result from the disease, even though it goes on to pelvic suppuration requiring operation.

The author has no sympathy for the man who commits adultery and brings a disease of the women of the streets to the pure woman whom he has promised to love, cherish and protect. He reaps his reward in due time. It is not to protect him that the need of caution is mentioned, but to protect the woman herself from unnecessary suffering. This can usually be accomplished by the exercise of a little tact. To the patient's question, "What is the trouble?" a good answer is "Inflammation." Then pass quickly to the directions concerning treatment. At a convenient time mention that the discharge is irritating and that she must be careful that none be carried to the eyes on contaminated fingers or serious inflammation of the eyes may result. The patient usually becomes so interested in the treatment that she forgets to inquire as to the cause of inflammation. However, if she asks, as they sometimes do even when having no suspicion, "Doctor, what is the cause of inflammation?" the usual reply is: "Inflammation is due to various causes," in a tone that shows that the physician has neither the time nor the inclination to give the patient a course in medicine in order that she may understand all the details about inflammation. This rarely fails to stop troublesome questions. Of course, some patients are so suspicious that they will not stop questioning until they have all the information they can possibly secure, while others are well aware of the nature of the trouble and question the physician out of curiosity or to see whether he has a grasp of the situation. With such, much time need not be wasted. Do not tell them the exact nature of the trouble when you do not think best to do so, neither tell them an untruth. When pressed too closely, simply remind them that their principal desire is to get well, that they have come for treatment, that they are receiving treatment, and have been given all the information necessary to treatment. If not satisfied with that they may go elsewhere.

Of course, some patients know or will probably find out in a short time the nature of the trouble. But it is preferable that they find out from some other source, if at all. Your imparting the information, or confirming that imparted by some of their anxious friends, will probably do no good and may do much harm.

d. Use the weak antiseptic wash every three to six hours, depending on the amount of discharge. If the vagina also is involved, have the patient, in addition to the external washing, take a douche of the weak antiseptic solution about every eight hours. The internal remedies mentioned are to be used as indicated by the special symptoms in the case.

e. the patient should be directed to return for local treatment every second or third day, provided she can do so without aggravating the inflammation.

If there is much discomfort in walking or if the patient must come a long way to reach the office, she will experience more benefit from remaining quiet at home and following the directions already given for the treatment there.

4. When the patient can come to the office without detriment, treat the affected surface just as described for the first visit. Such treatment, so applied as to cause no irritation, seems to aid materially in diminishing the patient's discomfort and in hastening the subsidence of the inflammation. The treatment is repeated every second or third day until all inflammation has disappeared from the affected surfaces, the intervals being gradually lengthened as improvement takes place.

It is not advisable during this first part of the attack, that is, in the first two or three weeks, to swab out the lower part of the urethra or of the cervical canal, or to inject medicine into Skene's glands or into the ducts of the vulvovaginal glands. Such treatment is likely to carry the inflammation further in than it might otherwise go, and may make parmanent an infection which nature would throw off if given a little time. If inflammation in any of these situations persist into the chronic stage, then they require particular treatment.

In those very severe acute cases where the patient suffers a great deal from the burning, itching, smarting and throbbing pain, and the trouble is increased when the patient stands, she should be put to bed and kept there until the most acute symptoms have disappeared. In the meantime, she should follow the directions given for the treatment at home.

The principal effect of the douche is to remove mechanically the irritating secrètion. It may be used warm or tepid or cool, as found most agreeable.

In cases where the smarting and itching are marked, the 25 per cent argyrol may be applied with the patient in bed, by bringing the patient around in the bed, with each foot on a chair, as for a vaginal examination (Fig. 182). If neither the cleansing nor the argyrol applications relieve the smarting about the external genitals, give the patient a description for the "lead and opium wash" and direct her to use it freely, dabbing it on with cotton balls frequently enough to keep the surfaces moist with it. In some of these severe cases, a hot sitz-bath every four to six hours gives considerable relief.

Treatment of Chronic Gonorrhea

A chronic gonorrheal discharge is due to persistence of the specific inflammation in one or more isolated areas. When such a discharge persists after the inflamed surfaces generally have returned to normal (i.e., after three to six weeks, depending on the severity of the inflammation), make careful search for its exact source. The situations in which the inflammation is likely to persist are the following:

Vulvovaginal glands or ducts.
Skene's glands, in the urethra.
Upper end of vagina.
Cervix uteri.
Corpus uteri.

In Vulvovaginal Glands or Ducts.—Persistence of the gonorrheal inflammation in the duct of a vulvovaginal gland, is indicated by reddening about the mouth of the duct and by a discharge from it, a drop of which may usually be pressed out. Microscopic examination of this discharge usually shows gonococci in abundance, though in some old cases they may disappear temporarily.

The **treatment** for this condition is to make an application of 25 per cent argyrol or 5 per cent to 10 per cent protargol once or twice a week. The application is made with a blunted hypodermic needle carefully introduced into the duct. Through this the solution is injected. If the inflammation subsides, the applications are kept up until all discharge ceases, the intervals between treatments being lengthened as improvement warrants.

If no decided improvement appears after several applications, the affected duct with its gland should be extirpated. Also, if the gland shows evidence of chronic involvement (firm nodule in that situation) it requires extirpation, for as long as it remains it prevents complete cure and the discharge from it is a source of danger.

If an abscess forms in the gland, it is allowed to develop until the gland is probably destroyed and the collection is near the surface, covered only by a thin wall of tissue. It is then opened freely. If the abscess is well developed so that all septa are destroyed and the recesses form part of the main cavity, there may be complete healing afterward and an end of the trouble. If a second abscess forms later, however, that means that portions of the infected gland remain, and in such a case, all the involved indurated tissue should be extirpated.

In Skene's Glands.—When the gonorrheal inflammation invades these periurethral ducts it may remain there indefinitely, causing symptoms of chronic urethritis or chronic cystitis and a persistent infective discharge. There is redness about the urethra and pouting outward of the swollen urethral mucosa. If the patient has passed through parturition, the opening of the duct on each side may usually be seen by rolling out the urethral mucosa (Figs. 237 to 241). If the duct is open a drop of pus may be pressed from it (Fig. 58). If the duct is closed, a small abscess forms in it.

To **treat** these conditions, apply a pledget of cotton soaked in a 20 per cent solution of cocaine, pushing a part of it a short distance into the urethra. Leave this in place five minutes and then proceed as follows:

If the duct is open, inject a 25 per cent solution of argyrol into it with a hypodermic syringe. Use a needle the point of which has been filed round and smooth, so it will easily pass into the duct without penetrating the wall. Fill the duct with the solution so that it comes in contact with all the recesses. This injection is repeated every few days, at the same time that other infected structures are treated.

If the inflammation persists in spite of this, then dilate the urethra and slit open the ducts and treat their interior directly with the solutions already mentioned. Some prefer to make strong applications to the ducts after they are slit open, for example, carbolic acid and tincture of iodine, half and half. The slitting open and treatment of Skene's ducts may be done under local anesthesia. In some cases there are other chronically infected areas that need painful treatment requiring a general anesthetic (extirpation of a vulvovaginal gland or dilatation and curettage of the uterus or excision of infected cervical tissue), and the urethral ducts may be taken care of at the same time.

In Vaginal Vault.—Persistent inflammation at the vaginal vault is due usually to an irritating and infective discharge from the cervical canal. The chronic uterine infection may be located in the cervix or in the body of the uterus. The treatment of these conditions will be found under inflammatory diseases of the uterus (see Chapter VI). Occasionally there will be persisting inflammation of the vaginal vault without involvement of the cervical canal, the cervical discharge being practically clear mucus, though considerably increased in amount by the hyperemia.

Whether the inflammation at the vaginal vault exists alone or is secondary to chronic gonorrheal endocervicitis or endometritis, it requires **treatment.** There are two methods of treatment—the glycerine-tampon treatment and the dry treatment.

1. GLYCERIN-TAMPON TREATMENT.—Introduce the speculum, expose the cervix and vaginal vault, cleanse the surfaces with an antiseptic solution, and treat the interior of the cervix if it requires treatment. Cleanse the surfaces again and dry them and then apply a 25 per cent argyrol or 10 per cent protargol or 10 per cent silver nitrate solution to the vaginal vault and vaginal surface of the cervix.

Wipe out the excess of fluid and then apply an absorbent-cotton tampon with the inner end soaked in 10 per cent ichthyol-glycerin or 10 per cent protargol-glycerin. It is supposed that the glycerin, by its hygroscopic action, helps to work the deeper gonococci towards the surface, where they may be acted on by the antiseptic. The tampon should be packed in rather firmly, so as to stretch the vaginal wall. This firm packing of the vaginal vault, smooths out the wrinkles and brings the gonococci nearer the surface. It has much the same effect that the passage of a large-sized sound has in chronic gonorrheal urethritis in the male.

This firm tamponade of the upper part of the vagina is best applied with the patient in Sims' posture or in the knee-chest posture. If there is much uterine discharge, this tampon must be removed by the patient in eight to twelve hours, and the antiseptic douches continued until she returns in two or three days for the next treatment. If the uterine discharge is slight, the tampon may be left in twenty-four hours, and then removed and the douches continued until the next treatment.

If there is decided infiltration and thickening of the vaginal wall, it may be advantageous to use 25 per cent ichthyol-glycerin on the tampon, for a few times. This causes desquamation of the superficial layers of the vaginal mucosa, thus bringing the medicine closer to the bacteria, and permitting better penetration of the affected tissues by the medicine.

2. Dry Treatment.—Expose the vaginal vault with the speculum, cleanse the surfaces, treat the interior of the cervix, if it needs treatment, and cleanse the surfaces again. Dry the vault well and apply the 25 per cent argyrol or 10 per cent protargol or 10 per cent silver nitrate to the affected surfaces.

Apply this thoroughly and let it soak into all the fine depressions. Then dry the wall again and dust in a large amount of some astringent-antiseptic drying powder. The author uses a powder composed of tannic acid (1 part), xeroform (1 part) and boric acid (3 parts). This is put in freely with the powder-blower. For throwing powders in large quantity into the upper part of the vagina, the author finds the ordinary 8-ounce Politzer-bag very convenient, the bag being about one-third filled.

After the powder has been dusted into the vagina, then a good-sized cotton or wool tampon is spread at its upper end and a quantity of the same powder placed in the depression, and the tampon carried to the vaginal vault. One or two smaller ones may be packed below it to hold it well in place.

The above constitutes a "dry treatment." If there is but little discharge from the cervix, this tampon may be left in place for two days, the patient returning then to have it renewed. In such a case the powder should be dusted in freely between the tampons, in order to have a strong antiseptic effect and prevent decomposition during the two days that the tamponade is in place. When the patient returns the tamponade is removed, the vagina thoroughly cleansed and another dry treatment given. These are continued until the vaginal wall has apparently returned to a normal condition, then the treatment is stopped and the case watched. Examinations to determine the amount of discharge and the condition of the vaginal vault, are made at intervals of a week or so, and also microscopic tests of any discharge that appears.

In a case where there is much uterine discharge, the tamponade must be removed in 24 hours and antiseptic douches continued until the patient returns for the next treatment. In such a case the tampons must be arranged with strings so that the patient may remove them easily. This modified dry treatment is very useful in cases where an endocervicitis is being treated at the same time. However, in the cases of persistent uterine discharge, it is useless to continue this treatment except as a palliative measure. As long as the infective uterine discharge continues, there will necessarily be irritation of the vaginal vault. In such a case, effective treatment for the chronic uterine inflammation is the important matter.

Serum and Vaccine Treatment.—Outside the local treatment, described above, in the last few years a general treatment with animal serums, and especially with vaccines, has been advocated by various writers. They have proved only partially successful. Practically no effect is obtained in the chronic cases in which the gonorrheal infection has led to pronounced inflammatory changes in the pelvis. The best results are seen with vaccines in cases of gonorrheal arthritis and in the gonorrheal vulvovaginitis of children.

Only rarely autogenous vaccines are prepared from gonococci cultured from the patient's cervical or urethral discharge. More commonly stock vaccines are employed, prepared from mixed cultures, as supplied to the trade by various reliable manufacturers. These vaccines are administered subcutaneously, the dosage being dependent upon the concentration of the preparation. In general the treatment is begun with a first injection of five million bacteria, the dosage increasing, according to reaction, to twenty million. Usually four to five injections being given at intervals of five to seven days.

In Cervix and Corpus Uteri. Gonorrheal inflammation of the uterus is considered in Chapter VI.

Gonorrhea in Children

Gonorrheal inflammation in female infants and children is more frequent than is generally supposed. In any case of severe or persisting discharge from the vulva, microscopic examination should be made in order to establish the presence or absence of gonorrhea.

In infants and children the process is more likely to be confined to the external genitals, for usually there has been no penetration into the vagina by the infecting agent. Some of these cases are due to rape, but probably the most of them are due to accidental contamination from soiled clothing or closet-seat or from the fingers of the mother or attendant.

Taussig (Am. Jour. Medical Sciences, Oct., 1914) in a study of a series of cases emphasizes the frequency of infection from the closet seat. Infection from this source is favored by the open conditions of the vulnerable portions of the genitals in the child, the protecting labia majora not yet fully developed and also by the height of the closet seat, making extensive contact unavoidable.

For the bacteriological diagnosis ordinary smear preparations are unreliable when negative. Norris (Jour. A.M.A., July 25, 1915) brings forward the use of centrifugal vaginal washings for bacteriological examination, by means of which he was able to demonstrate gonococci in 97 per cent of a series of cases. Wobus (Jour. Mo. State Med. Assn., March 1921) calls attention to the confusion caused by the Micrococcus catarrhalis, which is at times intracellular and has the appearance of the gonococcus and decolorizes by the Gram method. Though the Micrococcus catarrhalis, or pseudogonococcus, is ordinarily not pathogenic, it appears to cause a severe vaginitis in some cases, particularly in children. In doubtful cases cultural methods are necessary to positively differentiate the two organisms.

Extension upward to the tubes and peritoneum is not infrequent but occasionally occurs. Asch (Ztschr. f. Geburtsh. u. Gynäk., 1919, lxxxii, 28) calls attention to the fact that this should be kept in mind as a possible etiological factor in obscure cases of peritonitis in children and also in tubal occlusions found later in life without apparent cause. Gonorrheal vaginitis in early childhood may cause adhesions of the vaginal walls, which obliterate the vagina to a greater or less extent. Such condition seen in later life may be mistaken for a congenital atresia of the vagina.

Many forms of treatment have been used with only fairly satisfactory results. Some cases yield within a reasonable time to any one of several methods of treatment, and some cases persist in spite of the use of various methods.

It is important that the child's general health be built up, and during the acute and subacute stages rest in bed is necessary. The local treatment should be simple enough to be practical, should cause but little local irritation, and should be devoid of painful manipulations and frightening apparatus. One of the most practical and satisfactory methods is the repeated instillation of argyrol or silver nitrate solution. Taussig in the cases reported in his excellent article already referred to, used 25 per cent argyrol in the acute and subacute stages for the first two to four weeks, when it is advisable for the patient to be in the hospital if possible. The instillation is made with the ordinary small urethral syringe and 15 to 60 drops are injected several times in succession, the amount depending on the age of the child and the distensibility of the vagina. It is well to press the syringe against the hymen ring so as to secure some distention and thus gently force the solution into all of the crevices of the vaginal mucosa. This instillation is repeated twice daily.

As the subacute symptoms subside it is well to substitute 1 per cent silver nitrate for the argyrol solution and the instillation may be given once daily. When tolerance for the silver nitrate is established the strength may be increased to 2 per cent and the frequency decreased to every other day. In older children in the chronic stage the strength of the silver nitrate solution may often be increased to 4 per cent without undue irritation and with a hastening of the curative process.

By any method of treatment the progress is slow, but ordinarily with active treatment persistently carried out about 75 per cent of the cases can be cured in three to four months, though exceptional cases will require longer. Irrigation with various weak antiseptic douches does not seem to be so efficient as the instillation of the stronger solutions as above indicated.

In his article previously referred to, Norris advocated the dry treatment and elaborated a method of applying it. Gellhorn (Jour. A. M. A., Dec. 11, 1920) recommended a silver nitrate ointment (silver nitrate 1, lanolin and white vaseline of each 50) which was injected into the vagina, distending it. The treatment is given once daily without douching. Every seventh or eighth day after a period of rest, smears are made to see whether gonococci are still present. The ointment is soothing, excoriations disappear, and the treatment is shortened to weeks instead of months. Wachs and Mazer (New York Med. Jour., 1920, cxi) tried a silver paste but found the improvement only temporary.

Vaccines have been used extensively with different results by different persons. Hamilton (Jour. A. M. A., April 9, 1910) takes up the matter extensively and gives a comparison of results. In a series of 260 cases treated by irrigations, the period of treatment averaged ten months and only 60 per cent were cured. In a series of 84 cases treated by vaccines the period of treatment averaged less than two months and 90 per cent were cured. Though the reported results vary widely in different series of cases, the vaccine or bacterin treatment is certainly worthy of trial, particularly in cases that prove resistant to ordinary measures.

SIMPLE VULVITIS

Simple vulvitis is superficial inflammation of the external genitals due to irritation or to infection with ordinary pus germs. Sometimes it takes the form of scalding or chafing.

Etiology

The predisposing causes of simple vulvitis are poor general health, and local conditions which cause pelvic congestion, for example, pregnancy and pelvic tumors.

The exciting causes are as follows:

1. **An Irritating Vaginal Discharge.**—In the various forms of acute vaginitis and acute endometritis, the discharge alone may be sufficiently irritating to cause pronounced vulvitis.

In chronic vaginal discharge there may be considerable itching, and the consequent scratching and friction is principally responsible for the inflammation. In children this is a very frequent cause of troublesome and persistent vulvitis.

2. **Irritating Urine.**—Diabetic urine may cause vulvar irritation with resulting chronic inflammation and thickening of the tissues. In this condition there is a brawny induration with sometimes considerable enlargement. Other substances in the urine, such as pus, or high concentration of the urine, may cause irritation leading to scratching and consequent vulvitis.

3. **Parasitic Affections.**—In pediculosis pubis, the pediculi are located about the pubic hairs, where they cause much itching and irritation and may lead to vulvitis. Ascarides (the thread-worm of the rectum) may cause

severe scratching and vulvitis. In persistent vulvitis in children without apparent cause, the stools should be examined for the presence of the thread-worm or "seat-worm" as it is sometimes called.

4. **Masturbation.**—Friction from masturbation may lead to inflammation of the external genitals. There is usually some irritant that first causes scratching and the masturbation is an after-development. In children this may lead to severe vulvitis. In older persons it more frequently causes simply hypertrophy of the labia minora.

5. **Lack of Cleanliness.**—In exceptional cases, lack of cleanliness alone may act as a cause, but usually it serves only to aggravate the irritation due to some of the other causes mentioned.

6. **Acute Exanthemata.**—In eruptive diseases, the same process that affects the skin elsewhere may affect the vulva where, on account of the local heat and moisture, there may result much irritation and inflammation.

Pathology

In acute vulvitis there are the usual signs of inflammation, the intensity of the signs depending on the severity of the process. If very severe or if there has been much scratching, there may be denuded areas discharging serum or pus. If the inflammation has been present a long time and is consequently in the chronic stage, there is cellular infiltration of the tissues, with induration and discoloration and frequently considerable hypertrophy.

Symptoms and Diagnosis

The symptoms are itching and burning and heat about the genitals, with redness, swelling and discharge. There may be many abrasions due to scratching, and also small ulcers from the same cause. Often there is burning on urination and increased frequency of urination. In the chronic stage, the secondary conditions just mentioned under pathology are noticeable.

Gonorrheal vulvitis is distinguished by the characteristics mentioned under gonorrhea. In this connection it must be kept in mind that simple vulvitis may, in exceptional cases, lead to simple urethritis in the patient and even in her husband.

Treatment

After determining certainly that gonorrhea is not present (for it requires more active measures) proceed with the treatment of the simple vulvitis as follows:

1. **Secure Cleanliness.**—The parts should be washed several times daily with a boric acid solution or other mild antiseptic.

Small balls of absorbent cotton are very convenient for applying the wash to the surface and for removing the discharge. This keeps the parts clean and to some extent relieves the itching. After each washing, the parts should be thoroughly dried and then kept dry by being dusted freely with some drying powder, for example, stearate of zinc or bismuth subgallate or bismuth subnitrate or boric acid or equal parts of bismuth subcarbonate and prepared chalk or one of the numerous preparations of "talcum powder" prepared for toilet use. The inflamed surfaces should be kept separated by a pledget of cotton placed between them and renewed as soon as it becomes wet with the discharge.

2. **Remove the Cause.**—If the vulvitis is due to a discharge from vaginal or uterine disease, the nature of the disease must be determined and appropriate treatment, as described elsewhere, employed. In the case of uterine disease, if the discharge cannot be checked at once it may be kept from irritating the vulva by tampons, placed against the cervix and renewed often enough to absorb the discharge.

In children there is often what seems to be simply loss of tone with excessive secretion, giving a vaginal discharge. If this condition does not yield to tonic treatment and external cleansing measures, the treatment described for vaginitis in children should be employed.

If diabetes or other marked urinary disturbance is present, it will be discovered in the urine analysis, and must be given suitable treatment. In pediculosis pubis, a few inunctions of oleate of mercury will kill the parasites. If ascarides cause the trouble, give an enema of infusion of quassia (2 oz. to a pint of water) every other day until the worms disappear.

In masturbation, remove all local irritation, keep the genitals cleansed, give bromides to diminish the irritability of the sexual center and, if necessary, appeal to the reason and pride and fear of the child or adult, as the case may be, to prevent the continuance of the habit.

3. **Make Sedative or Astringent Applications.**—If the inflammation is acute and accompanied by burning and itching, not relieved by the cleansing measures, lead and opium wash may be used. A thick layer of absorbent cotton, or a soft cloth should be soaked in this solution and applied to the genitals after the cleasing with the carbolic wash. The lead and opium mixture may be kept applied to the genitals as long as the severe burning and smarting are present. It usually gives the desired relief. Other applications for relief of the itching and irritation will be found under Pruritus Vulvae.

In some cases in which an irritating discharge from the vagina or urethra cannot be stopped, the surfaces coming in contact with it may be somewhat protected by covering them with zinc oxide ointment. The ointment should be applied each time after the genitals have been cleansed with the carbolic wash and wiped dry. The addition of carbolic acid (2 per cent to 5 per cent) makes the ointment more effective in relieving pruritus. If this does not give relief, cocaine (2 per cent to 10 per cent) may be added.

Astringent and antiseptic applications have a direct effect toward diminishing the disease, and in most cases they can be used from the first. If the inflammation is acute and is accompanied by much discharge, the 25 per cent argyrol solution is beneficial. It should be applied carefully over all the inflamed surface every second or third or fourth day. A saturated solution of aluminum acetate makes a soothing wash. Dissolve a teaspoonful of the powder in a quart of hot water and let it cool for use. Apply as a wash several times daily.

4. **Internal Treatment.**—Administer tonics or sedatives or other internal remedies as indicated by the conditions present. Patients in poor general health should have appropriate tonic treatment. If there is chronic constipation, laxatives should be given. If there is much urethral irritation, as indicated by frequent or painful urination, give the hyoscyamus and potassium citrate mixture, as follows:

℞ Pot. Citrat.	20.	(ʒ v)
Fl. Ext. Hyoscyami	2.	(m. xxx)
Fl. Ext. Zeae	60.	(℥ iv)
Aquae q.s. ad.	120.	(ʒ iv)

Sig.: Two teaspoonfuls in water every 6 hours when urination is painful.

If the urine is concentrated, direct the patient to drink an abundance of water. Lemonade, not too sweet, is pleasant for a change and helps to make the urine less irritating.

If the patient loses sleep or is made nervous by the vulvar irritation, it is well to administer a mild sedative, such as sodium or strontium bromide.

FOLLICULAR VULVITIS

Follicular vulvitis occurs in adults. It is characterized by the inflammation being confined principally to the hair follicles and sebaceous glands, the inflamed structures being represented by small red papules scattered over the labia (Fig. 254).

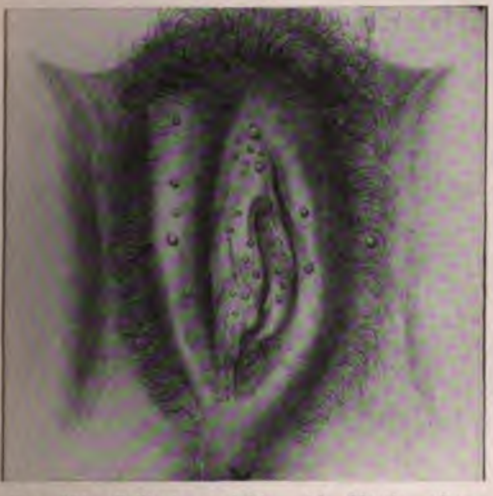


Fig. 254.—Follicular vulvitis. (A. Martin, after Huguier—*Atlas of Gynecology*.)

The causes, symptoms and treatment are the same as described under simple vulvitis. This form of vulvitis is prone to become chronic and resist treatment, consequently it should be treated vigorously. The measures mentioned under simple vulvitis (acute and chronic) should be used. The following sometimes gives relief.

℞ Liq. Ferri Subsulphatis,	4.
Glycerini, q. s. ad.,	30.

Sig.: Apply two or three times daily with a camel's-hair brush.

If pus forms in the follicles, they should be evacuated and then washed out with hydrogen peroxide. If there is much local inflammation, hot compresses wrung out of weak carbolic solution may give much relief.

Follicular vulvitis sometimes appears during pregnancy and disappears spontaneously afterward. In rare cases the irritation has become so severe that it caused abortion.

ERYSIPELAS OF VULVA

Erysipelas of the vulva, like erysipelas elsewhere, is a rapidly spreading inflammation produced by the streptococcus pyogenes.

Etiology and Pathology.—The streptococcus pyogenes, or "streptococcus erysipelatis," as it is sometimes called, enters through a crack or scratch or abrasion or other open place in the protecting epithelium. Once within the subepithelial tissue it multiplies rapidly, causing marked inflammation with a superficial parchment-like induration of the involved surface. There is also inflammatory edema of the deeper tissues, causing marked swelling of the vulva. The inflammatory process spreads rapidly by a well-defined margin which is red and slightly raised.

If the inflammation is intense, small vesicles may appear at various places on the surface and rupture, discharging serum. The process may extend up onto the abdominal wall or out onto the thighs or into the vagina.

Symptoms and Diagnosis.—In the beginning there is usually a chill, followed by considerable fever and the general disturbance usually associated with fever. The patient complains of heat and throbbing in the external genitals. The fever continues and swelling of the vulva is noticed. The patient then comes for examination, which reveals the condition described under pathology. Later, pus may form. In the diagnosis, differentiate from scarlatinal rash on vulva, from intertrigo, from bichloride rash, from cellulitis of vulva and from hematoma.

Treatment.—The general and local treatment is the same as for erysipelas elsewhere. Considerable relief will be afforded by applying pieces of absorbent cotton, or gauze, soaked in carbolized olive oil (1 to 2 per cent). The exclusion of air seems to diminish the burning. The application of an ice-bag outside the oil dressing, tends to check the pruritus and the swelling. The bowels should be moved well. If the fever is high, it may be reduced by cool sponge-baths or by some of the reliable antipyretics. Quinine in moderate doses and tincture of the chloride of iron in large doses are time-honored remedies for infective processes. An abundance of water should be given to help the skin and kidneys in elimination. If the patient is weak, strychnia and other stimulants and tonics are indicated.

In serious cases, some reliable antistreptococcus-serum should be used promptly and freely. Some cases are greatly benefited by it and other cases are not affected at all. Bacterin or vaccine treatment is beneficial in some cases. Stock vaccines may be used while an autogenous vaccine is being prepared.

Unguentum Credé is an excellent local application for the inflamed area. Other local applications, found by experience to be more or less effective, are carbolized liquid vaseline (5 per cent) painted over the surface with a camel's-hair brush, ichthyol and glycerin equal parts, or ichthyol and vaseline equal parts.

Subcutaneous injection of various antiseptic solutions at the spreading margin, has been recommended. But this gives the patient considerable pain, and the results are uncertain and not encouraging.

If collections of pus form, they should be incised and the cavities washed out with hydrogen peroxide and drained.

CELLULITIS OF VULVA

Cellulitis of vulva is that form of vulvitis in which the bacteria (usually the Staphylococcus pyogenes aureus or albus) penetrate to the subcutaneous connective tissue and cause inflammation there. It is known also as "phlegmonous," vulvitis and as "lymphangitis" of vulva. It lacks the superficial parchment-like induration of erysipelas.

Etiology and Pathology.—Anything that causes an abrasion about the vulva, through which bacteria may reach the connective tissue, may lead to phlegmonous vulvitis. Any of the previously mentioned forms of vulvitis may be followed by this form. Injuries to the vulva or furunculosis, may lead to the same. The pathologic changes are the same as in phlegmons elsewhere. There is marked inflammation of the connective tissue and of the lymph channels. Resolution may take place or the process may go on to suppuration. Occasionally suppuration of the inguinal lymphatic glands occurs.

Symptoms and Diagnosis.—The symptoms are those of simple vulvitis with the addition of pain and swelling, indicating deeper inflammation. Sometimes there is considerable fever, but not always. The swelling may be very marked, the inflammatory exudate sometimes distending certain structures almost beyond recognition.

It may be confounded with hematoma of vulva. The latter is distinguished by the sudden onset following some injury or slight surgical procedure, for example, the introduction of a hypodermic needle for the purpose of drawing off fluid from a cyst. The hematoma begins within a few hours after the injury and increases rapidly in size, with pain but no fever. The distinctive signs of acute inflammation are absent. Hematoma sometimes occurs in pregnancy without injury, being due to subcutaneous rupture of a varicose vein.

When phlegmonous vulvitis is confined to one side, it may resemble pudendal hernia or pudendal hydrocele. In each of these affections, acute inflammation is absent at first and, also, there are special characteristics that indicate the nature of the swelling.

Treatment.—The treatment is the same as for cellulitis or lymphangitis elsewhere. The patient should stay in bed, and hot compresses, made by wringing absorbent cotton out of hot water or weak carbolic solution, may be applied to relieve the pain and limit the inflammation. If there is much superficial irritation, it may be diminished by the measures given under simple vulvitis.

Pelvic congestion should, as far as possible, be overcome by laxatives and other measures as indicated. Hot sitz-baths sometimes give decided relief. If the inflammation is severe and spreading rapidly, it may be advisable to make several incisions through the involved area, such as are made for severe spreading subcutaneous inflammation in other localities. If an abscess forms, it must be opened and drained.

GANGRENOUS VULVITIS

Gangrenous vulvitis is known as **noma.** It is inflammation of the vulva of such severity that the nutrition of the structures is cut off and they become gangrenous. Extensive sloughing may take place.

Gangrenous vulvitis occurs almost exclusively in patients in whom the normal tissue resistance has been destroyed by exhausting general or local diseases. Local conditions interfering with the pelvic circulation, such as pregnancy and pelvic tumors, predispose to this affection.

Its most frequent victims, however, are children who are poorly nourished and poorly cared for. In such it is often fatal. The exanthemata, particularly when occurring in sickly children, may cause gangrenous vulvitis.

The **treatment** is the same as for phlegmonous vulvitis, with the addition of tonics and stimulants, as indicated by the patient's general condition. In some cases it may be advisable to excise the gangrenous tissue and cauterize the remaining wound. The ulcerated surfaces remaining after the sloughs separate, require the regular treatment for ulcers of the vulva.

DIPHTHERITIC VULVITIS

Diphtheritic vulvitis, like diphtheritic vaginitis, is simply diphtheria with anomalous location of the membrane, and requires the regular treatment for diphtheria, namely, antitoxin, stimulants, nourishment, and local measures to keep the infected surfaces clean and hasten removal of the membrane. It is rare, and is due to the same cause as diphtheritic vaginitis.

ECZEMA OF VULVA

Vesicular eczema of the vulva is most frequently located on the labia majora. The vesicles break and form crusts, and an itching, inflamed discharging surface persists. Chronic erythematous and squamous eczema also may occur, in which case the skin is infiltrated and may become nodular. The eczema may be limited to the vulva or it may extend to the adjacent cutaneous surfaces or into the vagina.

Causes and Symptoms.—The predisposing causes are the same as predispose to eczema elsewhere, namely, general nutritive disturbances characterized by gastrointestinal disorders or rheumatism or gout. The local nutritive disturbances accompanying the menopause seem to predispose to eczema of the vulva. The exciting cause is usually some local irritation, such as vaginal discharge, diabetic urine and other causes of irritation mentioned under the etiology of simple vulvitis.

The symptoms of eczema of the vulva are practically the same as of eczema elsewhere, i.e., burning, itching, infiltration and induration, with some thickening of the parts and frequently a discharge.

Treatment.—The indications for treatment are to allay the local irritation and correct so far as possible the general nutritive disturbances, as in the treatment of eczema in other localities. Alcoholics, spices and highly seasoned foods must be forbidden. In acute eczema of the vulva, the measures recommended under acute vulvitis may be employed. The lead and opium wash gives much relief, or the calamine and zinc lotion (zinc oxide 7 parts, prepared calamine 3 parts, glycerin 12 parts, and liquid calcis sufficient to make 100 parts) may be used. A soft cloth may be wet in this lotion and applied to the parts, being held in place by a T-bandage. If the irritation is marked, keep the cloth constantly wet with the lotion. Another way of applying the lotion, where the irritation is not so great, is to mop it over the parts and allow it to dry and form a protective coating.

As a cleansing agent, hydrogen peroxide is exceedingly useful and may be applied in all stages of the disease, either diluted with one or two times its volume of water, or used full strength. Another excellent application in acute eczema of this region is the "black wash." This is mopped freely on the parts for several minutes and then allowed to dry. It forms a protective sediment, over which may be applied a sedative ointment. This application may be repeated every few hours. During the acute stage, a soothing ointment such as zinc oxide is useful, particularly if the patient has to be up and about. This may be applied each time after the application of one of the lotions above mentioned.

In the subacute and chronic cases, and these are the most frequent, the diachylon ointment (equal parts of emplastrum plumbi and vaseline melted together) may be used with much benefit. In the more sluggish cases, emplastrum plumbi undiluted may be used. Cleanse the affected surface thoroughly with green soap and cotton balls, dry it and then apply diachylon ointment spread on gauze or better still, small strips of bandage muslin. This dressing should be held firmly against the surface by a T-bandage. The ointment should be kept applied continuously for several days, no water being used locally except what is absolutely necessary for cleanliness. In four or five days the cleansing with green soap may be repeated to be followed by the application of the ointment. If the eczematous process is sluggish and more stimulation is required, the diachylon plaster (emplastrum plumbi) may be used full strength, applied on muslin the same as the ointment.

Tar ointment is still more stimulating to the skin, and sometimes gives better results than the diachylon treatment. It is indicated in the dry scaly forms and should be applied tentatively as, in some persons, it produces too much irritation. Begin with a preparation containing a small amount of tar. If this produces no irritation and a stronger stimulant is needed, the quantity of tar may be doubled and later quadrupled. The tar ointment may be applied on strips of muslin or the patient may rub it into the surface with the fingers. Some think the rubbing in of the ointment makes it more effective.

Tar ointment is not indicated when there is deep infiltration. It is most useful in the superficial chronic scaly form.

When pruritus is marked, the application of hot water for a short time, followed by the application of an ointment, sometimes gives much relief. The ointment to be used should be at hand ready for application. Then a cloth wet in very hot water is applied to the involved area and held there for a few minutes until it begins to cool. The surface is then dried with a soft cloth or cotton and the ointment applied at once.

An occasional application of silver nitrate solution (4 per cent to 10 per cent) is of decided benefit in some cases.

In the very chronic cases, one plan of treatment is to go over the surface with a sharp curet and, following the curettage, to rub into the surface a 3 per cent solution of salicylic acid in alcohol and then apply the diachylon ointment spread on muslin. In place of the curet the affected area may be scarified with a knife, the scarifications being made deep enough to cause considerable exudate and bleeding, which may be further promoted by the application of hot water for a short time. Then the parts are dried and the salicylic acid in alcohol applied, followed by the diachylon ointment.

INTERTRIGO

Intertrigo is a hyperemic condition of the skin, with slight maceration and consequent irritation. The patients usually refer to it as "chafing" or "heat." It is due to prolonged contact and friction of opposed surfaces. The normal skin secretions are retained between the approximated surfaces and become decomposed and irritating. It occurs most frequently in stout women and in infants, because in them the skin surfaces are in contact more constantly and over a wider area. It is usually worse in hot weather because the skin secretions are increased then, and also because the additional heat hastens decomposition. Intertrigo in this region may be caused or, if present, may be made worse, by anything that acts as an irritant to the skin, for example, vaginal discharge, uncleanliness and the various etiologic factors mentioned under Acute Vulvitis.

The process may affect any surfaces kept in apposition. It is usually located in the genitocrural creases, but may spread inward over the labia or outward over the thighs and upward on the abdominal wall. At first, intertrigo consists simply of hyperemia and slight irritation of the skin, but after a time there is considerable serous and cellular infiltration, with thickening and fissures and pigmentation. Infection may take place through some of the fissures or abrasions, and the result is an acute inflammation of the skin.

Intertrigo gives rise to a great deal of burning and itching and discomfort, frequently to such an extent that walking causes much distress. When the irritation is marked, there is a serous secretion from the surface, which adds to the patient's discomfort and to the local irritation by soiling the adjacent portions of the clothing. Clinically the dividing line between intertrigo and eczema is not distinct.

Treatment.—Secure cleanliness by the frequent application of a carbolic wash or a strong solution of baking soda (tablespoonful to a pint of water). After each washing, the parts should be carefully dried and then dusted freely with some drying and antiseptic powder. After the application of the powder, a piece of cotton or gauze should be placed so as to keep the affected surfaces from coming in contact. The cleansing and dusting must be done from three to six times daily, i.e., frequently enough to keep the surfaces clean and dry. If the patient can rest in bed for a few days, the surfaces may be covered and kept separated by pieces of gauze wet in the calamine lotion (see Eczema of Vulva).

The treatment is much more effective when the patient can be kept quiet and in bed. If she is obliged to work during the day, frequent washings, of course, cannot be employed, and it is then advisable to prescribe a sedative ointment such as carbolized zinc oxide ointment to be applied between the applications of the lotion. The surfaces must be kept separated by a soft cloth or cotton.

In chronic cases, some of the stimulating ointments mentioned under Eczema are beneficial. Eczema may develop over an area of intertrigo, and in that case the treatment given under Eczema is required.

Ravogli recommends the following measures for intertrigo. When the surface is excoriated and there is considerable secretion, keep the patient in bed and apply Burow's solution (aluminium acetate) in strength of 3 per cent, on strips of lint, which serve to keep the surfaces apart. This usually causes the intertrigo to disappear after a few applications. If the patient must work, then the bathing with the above solution may take place morning and evening, while during the day some sedative ointment may be applied to the surfaces, which should be kept separated with soft lint.

To prevent relapses, it is well to wash the creases in the genitocrural region very frequently and keep them dusted with starch powder containing 2 per cent of boric acid or salicylic acid, or with some other suitable dusting powder.

HERPES OF VULVA

Herpes may occur on the vulva, where it is known also as "herpes progenitalis." The vesicles of the herpetic eruption are usually of larger size than those of vesicular eczema. Furthermore, they occur in groups and do not rupture easily, whereas the vesicles of eczema rupture spontaneously, causing a sticky discharge. Herpes is seldom accompanied by the intense burning and itching which characterize eczema. Herpes occurs especially in nervous women, particularly when there is marked pelvic congestion from any cause. With some women it occurs at nearly every menstrual period.

The discomfort from uncomplicated herpes is so slight that not much treatment is required. The parts should be kept clean and dry and may be dusted frequently with some drying powder, for example, equal parts of zinc oxide and prepared chalk. All irritation should be avoided. If there is troublesome pruritus or burning or smarting, a sedative lotion or ointment may be used. The erosions left by rupture of the vesicles should not be cauterized, as it is not necessary and may cause deep ulcers.

PRURIGO OF VULVA

This is a rare disease of the skin, beginning usually in early childhood and reappearing in later life at irregular intervals and sometimes continuing for long periods. It is characterized by a papular eruption and very troublesome itching. The papules are at first of the color of the skin and are more readily felt than seen, giving, on palpation, a rough "goose-skin" sensation. Later there are various secondary changes (abrasions, pigmentation, desquamation and decided infiltration and thickening) due to the scratching excited by the severe pruritus. The pathology of the disease is somewhat in doubt, some authorities holding that it is a neurosis and others holding that it is dilatation of the lymphatics, causing irritation of the nerve filaments of the skin. The disease is usually limited to the extensor surfaces of the arms and legs, the genitals being rarely affected. When it does affect the genitals, it causes troublesome and persistent pruritus, helping to swell the list of cases of "pruritus vulvae."

In the **treatment**, the patient's general health should be put in the best condition. The irritability of the nervous system should be reduced by the administration of sedatives, such as bromides or cannabis indica. The pruritus is diminished in some cases by tincture of cannabis indica by the mouth and also by pilocarpine hypodermatically. Locally, an ointment containing menthol or both menthol and chloroform may give much relief. The salicylic acid and creosote ointments have also proved useful. If the itching is severe and persistent in spite of the ointments mentioned, cocaine suppositories may be used for temporary relief. The cocaine suppository is to be introduced into the vagina when the itching is severe, and as the suppository melts the medicine becomes distributed over the affected surfaces. Other remedies for the itching may be found under Pruritus Vulvae.

PARASITIC DISEASES OF VULVA

The parasitic diseases, pediculosis and scabies, occur on the vulva as elsewhere on the body surfaces. They give rise to much irritation and, unless search is made for the parasites, the patient may be treated ineffectually for a long time for the resulting pruritus and irritation.

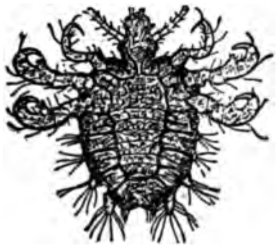


Fig. 255. — The pediculus pubis, magnified. (Stelwagon —*Essentials of Skin Diseases.*)

Pediculosis Pubis

Pediculosis pubis is the most common parasitic disease of the vulva. The pediculus pubis or "crab louse" (Fig. 255) differs from the pediculi found on other parts of the body. It inhabits the pubic hairy region and may give rise to much irritation. It is conveyed from one person to another by contact, usually in sexual intercourse.

There is itching and consequent scratching, with resulting abrasions and vulvitis. The diagnosis is made by finding the parasites which are attached to the hairs near the skin. At first they may not be noticed, but on close inspection they are seen as small brownish particles attached to the hairs very close to the skin.

The **treatment** is to apply oleate of mercury (10 per cent) once daily, rubbing it well into the hairy region. After the remedy has been applied for four or five days it may be washed off, and need not be applied again unless there develops evidence that some of the parasites escaped destruction. At the end of the treatment, a soap and water bath and complete change of under clothing must take place. An excellent and effective preparation used in the same way is Kaposi's petroleum salve. Some recommend to shave the pubis or to clip the hair there, but that is usually not necessary. If there is much local irritation remaining after the parasites are killed, the measures given under Simple Vulvitis may be employed.

Scabies

Scabies may appear about the external genitals as part of an extensive development of scabies, the infection usually appearing first on the fingers. There are the usual symptoms—severe itching, worse when the body is warm, and the abrasions and irritation resulting from scratching. The diagnosis is made by finding the burrows of the itch-mite on other portions of the body, usually on the fingers.

The **treatment** consists of a warm soap-water bath followed by the free use of a sulphur ointment. Immediately after the bath, the patient should rub the ointment thoroughly into all the infected areas, and put on clean underclothing. The inunction should be repeated night and morning for three days, the same underclothing and the same bed linen being used during the course. On the fourth day a warm soap bath should be taken and clean underclothing put on. If some irritation of the skin remains, a mild ointment, such as zinc oxide ointment or carbolized vaseline, may be used for a few days. If any of the burrows, containing the ascarus scabiei, escape the first unction course, another similar course must be carried out.

SIMPLE VAGINITIS

Simple vaginitis is inflammation of the vagina due to irritation or to the ordinary pus germs. It is known also as "catarrhal vaginitis."

Etiology.—The normal vaginal secretion is destructive to the ordinary pus germs and tends to protect the vaginal wall, as well as the cervix uteri, from infection. Anything that lowers the nutrition of the vaginal wall interferes also with the protective action of the vaginal contents and hence predisposes to inflammation. Debilitating diseases of every kind have that effect to some extent, but it is especially noticeable in those conditions causing congestion of the vagina, such as pelvic tumors, pelvic inflammatory affections, pregnancy and heart disease. In the presence of any of the predisposing causes, and sometimes without them, vaginitis may be produced by the following causes:

1. Use of an infected syringe nozzle or syringe, carrying staphylococci or streptococci into the vagina. Ordinarily these germs are killed by the vaginal contents, but in cases in which the nutrition of the vaginal wall is disturbed and the resistance consequently lowered, these germs may multiply rapidly and cause severe vaginitis.

2. An infective uterine discharge, for example, in acute septic endometritis.

3. Decomposition of a chronic uterine discharge. Ordinarily a chronic discharge from the uterus passes out of the vagina, causing only slight irritation, but if it is retained long in the vagina, decomposition takes place, causing marked irritation and vaginitis.

4. Use of very hot douches continued for a long time, or of strongly irritating substances in the vagina, for example, where a too concentrated douche solution is used by mistake, or where some irritating substances are introduced into the vagina for the purpose of causing an abortion.

5. Foreign body in the vagina. A pessary worn too long or without proper precaution may cause severe local vaginitis, extending even to ulceration. In some cases of this character it has happened that the ulceration has extended deeply into the vaginal wall. Kelly illustrates a case in which ulceration took place with so much resulting cicatricial contraction below the pessary, that the vagina was occluded and a collection of pus formed above the point of occlusion. Foreign bodies introduced for the purpose of masturbation are liable to cause vaginitis.

6. In sexual intercourse, germs, other than the gonococcus, may be carried into the vagina, and, if the soil is favorable, simple vaginitis will result. Again, slight traumatisms in difficult coitus furnish an entrance for germs, with resulting vaginitis.

7. In the exanthemata—measles, scarlet fever and the other eruptive diseases—the eruptive disturbance may extend to the vagina, causing much irritation and, as a consequence, vaginitis.

Pathology and Symptoms.—The inflammatory phenomena are the same as in gonorrheal vaginitis, except not so marked. The vaginal walls present active congestion. They are red and hot, and manipulations cause pain. At first the secretion is slight, but very soon it is increased and becomes purulent. There is a serous and cellular exudate into the vaginal wall and the superficial layers of epithelium are thrown off and form part of the discharge.

In chronic cases the acute symptoms have disappeared but the cellular infiltration and epithelial exfoliation persist. The papillae may become especially swollen, giving the sensation of a rough granular surface. The longer the process continues, the deeper the infiltration extends.

In acute vaginitis usually the first symptoms are dryness, heat and itching in the vagina and about the vulva. Later a discharge appears with con sequent irritation about the vaginal orifice and the meatus. The vulvar irritation and the urinary disturbance are usually not nearly so marked as in gonorrhea. General disturbances are slight. The patient feels somewhat feverish, but decided rise of temperature is rare, and when present should arouse suspicion of complications.

Diagnosis.—The fact that the vagina is inflamed can be directly demonstrated in the examination, so it remains only to distinguish simple vaginitis from the other forms of vaginal inflammation.

GONORRHEAL VAGINITIS is distinguished by the following:

a. Inflammation is rapid in development and severe.

b. Involvement of urethra and vulvovaginal glands.

c. No other apparent cause.

d. Gonococci in the discharge.

e. History of suspicious coitus within a few days before the beginning of the trouble. In exceptional cases a simple vaginitis may give rise to a simple urethritis in the husband. But simple vaginitis never gives rise to a gonorrheal urethritis, as some husbands for obvious reasons will endeavor to claim.

TRICHOMONAS VAGINITIS.—The characteristics of this very troublesome vaginitis are given below.

DIPHTHERITIC VAGINITIS is distinguished by:

a. Development of a false membrane on the vaginal wall.

b. Marked systemic effects.

c. Presence of diphtheria bacilli, as demonstrated by bacteriologic examination.

ADHESIVE VAGINITIS presents the following characteristics:

a. Inflammation is only chronic or subacute.

b. Occurs in patches, resembling abraded areas.

c. Walls of vagina adhere, and separation of the adhesions causes a bloody discharge.

d. Patient is usually past the menopause.

Treatment.—In the severe cases the same treatment is indicated as in gonorrheal vaginitis. Usually, however, the inflammation is comparatively mild, and an antiseptic douche, such as lysol, teaspoonful to two quarts of water, two or three times daily is all that is required. The cause must be sought and removed, for example, if it is due to an irritating discharge from the uterus, the uterine lesion must receive appropriate treatment.

Simple Vaginitis in Children

In children a troublesome discharge sometimes appears and gives rise to much vulvar irritation. The trouble is frequently not severe enough to be called inflammation of the vagina—there seems to be simply an excess of secretion, causing a vaginal discharge. But the vulvar irritation, which is the most marked symptom, often necessitates measures to stop the excessive secretion. The **treatment** of this affection consists in keeping the external genitals clean and dry by washing frequently with weak carbolic solution, then drying with absorbent cotten and then dusting with a drying powder, such as boric acid powder. Bismuth subnitrate and prepared chalk, equal parts, is also a good dusting powder. Keep the vulva covered with a pad of absorbent cotton.

The child should be put in first-class general health. Often the patient presents lowered vitality and anemia and a general relaxation or want of tone in the tissues—the so-called strumous diathesis. In such a case, a course of tonic treatment, restoring the patient's vitality, will often cause the discharge to cease. If the discharge persists, the measures mentioned under gonorrheal vaginitis in children may be employed.

TRICHOMONAS VAGINITIS

There is a very troublesome form of vaginitis apparently due to the trichomonas vaginalis. This protozoan is frequently found in the vagina and is ordinarily considered nonpathogenic. It is found in about 40 per cent of all free vaginal discharges and is found in very large numbers in practically all severe and obstinate cases of vaginitis. Schroeder and Loeser (Monatsch. f. Geburtsh. u. Gynäk., 1919, xlix) investigated the bacteriology of the vagina in over two thousand gynecological patients. The trichomonas vaginalis was found in only about 6 per cent. Comparing their results with those of previous investigators, they confirm the common assumption that most of the bacteria vegetating in the normal vagina originate from the intestinal tract. The trichomonas vaginalis is no exception, its normal habitat being in the Lieberkuehns glands of the intestine. Schroeder and Loeser state that in most cases of colpitis presenting a large number of trichomonades there is also present the micrococcus gazogenes alcalescens which is responsible for the foamy character of the discharge. They conclude that the trichomonas vaginalis is not essentially pathogenic and that its presence in large numbers in certain cases of vaginitis is simply incidental to the abnormal flora that favors its growth, hence they feel that the term "trichomonas vaginalis" is hardly justified. However, most writers favor retaining the term as expressive of an important clinical type of vaginitis characterized by the presence of large numbers of the trichomonas vaginalis and subsiding when this organism is eliminated.

The patient complains of a constant free vaginal discharge which is usually very irritating. In the typical cases there is much irritation of the external genitals and "scalding" of the adjacent surfaces of the thighs. This leads to itching and burning, which disturbs the patient day and night, interfering with her work and with her sleep and eventually with her general health. In some cases the discharge is so free that a pad must be worn continually, and the odor also is very disagreeable. The discharge persists in spite of ordinary douching and often in spite of a prolonged course of local treatments, and the patient may be consequently much discouraged as to the prospect of eventual cure.

Examination shows the external irritation mentioned and a free yellowish discharge, suggestive of gonorrhea but without the distinct localization in the urethra, vulvovaginal glands or cervix. In some cases condylomata have developed from the irritating discharge. Speculum examination shows a definite vaginitis. If the process is acute the vagina is reddened generally and rough and tender, and usually small hemorrhagic spots may be seen. The vaginal vault is filled with the free yellow discharge which often contains some bubbles, giving it a foamy character. The secretion is strongly acid. In the chronic cases the general vaginal inflammation may have subsided leaving only scattered red papules, which give a granular appearance to the vaginal wall and which are responsible for the old term, "granular vaginitis." Microscopic examination of a stained smear eliminates gonorrhea.

The clinical characteristics mentioned and the elimination of the gonococcus practically establishes the diagnosis of trichomonas vaginitis. However, it is well to confirm the diagnosis by demonstrating the trichomonas.

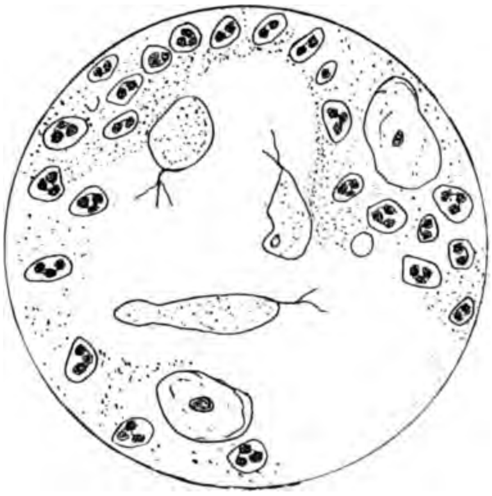


Fig. 256.—A composite field in a case of trichomonas recently examined by the author. Three of the organisms stand out well in the center of the field. They are three or four times the size of the adjacent pus cells. The flagellum moves rapidly sweeping particles into the ostium of the organism and at the same time causing the organism to move forward flagellum-end first. The two upper trichomonades were in the same field, while the lower one was in the next field. The lower one and the middle one varied much in shape while under observation.

Stained smears do not show the trichomonas well and hence are not of much assistance in the diagnosis, except to eliminate the gonococcus as the cause of the free, yellow discharge. To show the trichomonas, a little of the yellow secretion from the vaginal vault is placed on a warm slide, covered with a cover-glass and examined fresh before it becomes chilled or dried. It may be kept warm on the microscopic stage by bringing the electric light and reflector near. Examined with the oil immersion lens (Fig. 256) and with the light stopped down to give good outlines, the field is filled with pus cells, vaginal cells, and debris. At certain spots in the thinner fields there is much movement. Careful examination at such a spot will show a rounded, oval or irregular-shaped body (Fig. 256) three or four times the size of a pus cell and with much movement about one end. Closer examination will show that this movement is produced by a slender projecting arm or flagellum, which by its rapid sweeping movements disturbs the pus cells and debris in that vicinity and sweeps into the ostium of the cell many small particles. The particles may be seen to pass into the cell, where they continue a rapid dancing movement. When the flagellum is moving rapidly it can hardly be seen, but as the cell activity slows the flagellum may be easily seen and two or three branches of it may be identified (Fig. 256). If the cells are crowded together, a drop of water run under the cover-glass will thin the specimen and give open spaces in which the trichomonades may deport themselves. In these open spaces the movement of the flagellum carries the organism about the field. The active organism changes much in shape, being at one time round and at other times oval or pyriform and still again lengthening to a long roll. Fig. 256 shows three common shapes observed by the author in a case recently examined.

Treatment.—Ordinary treatment for vaginitis has very little effect in curing trichomonas vaginitis. These protozoa flourish in strongly acid secretions and their elimination is favored by overcoming temporarily the acidity of the vagina. De Lee (Ill. Med. Jour., 1920, xxxvii) found the following treatment most effective. The first day the vagina and the vulva are carefully and vigorously scrubbed with green soap and water, using a rough cloth. The soap is rinsed out with distilled water. The process is repeated three times, followed by a 1-1500 mercuric chloride douche and finished with another douche of distilled water. The patient is kept in bed. The next morning the vagina is again scrubbed with green soap and sterile water and then packed with cotton soaked in a mixture of one ounce sodium bicarbonate in four ounces of glycerin. The following morning the cotton is renewed, a sterile-water douche given. As a rule the next day (fourth day) microscopic examination will prove the disappearance of the trichomonas.

The above treatment is rather severe and not always effective. Hartwell (Colorado Medicine, April, 1922) tried it but found a simpler treatment more satisfactory. He placed sodium bicarbonate powder in the vaginal vault. The next morning the patient took a douche of plain water and came in the afternoon for another application of the sodium bicarbonate powder. He found that daily treatment for two weeks and treatment every second day for another four weeks, freed the vagina of the trichomonades. A quicker result may perhaps be secured by making the douches strongly alkaline (a tablespoonful of sodium bicarbonate to two quarts) and directing two douches on the days when no local treatment is given. The external irritation usually quickly subsides as the discharge diminishes. If severe or persistent, it requires the ordinary treatment for vulvitis.

Other parasites which occasionally cause trouble in the vagina are the Ameba urogenitalis, which invades the bladder causing hematuria, and the Distoma hematobium which also infests the urinary tract. The latter is found in a large percentage of Egyptian women. It may propagate in the vulvar epidermis and cause condylomata. It may cause chronic inflammation of the vaginal wall with infiltration, while on the cervix uteri the papillary outgrowths from it may resemble carcinoma.

APHTHOUS VAGINITIS

Aphthous vaginitis is the term applied to inflammation of the vagina due to the same fungus which causes thrush in the mouth. It is known also as "mycotic vaginitis."

The cause is invasion of the vagina by parasites of the order of Oidium albicans, or, perhaps more correctly, Saccharomyces albicans. The infection is carried to the genitals usually by the fingers of the patient, who has been handling some organic substance on which the fungus was growing. A mother whose baby is suffering with thrush may infect herself. It usually occurs in nursing women or in pregnant women or in cases of prolapsus uteri. It is said to occur sometimes as the result of sexual intercourse with a diabetic husband.

The pathologic changes are practically the same as in thrush in the mouth. There are white patches, representing the growing fungus, and accompanying inflammation of the adjacent tissues. The patient complains of burning, itching or smarting, but there is not much discharge. In the examination through the speculum, the vaginal wall presents the ordinary evidences of inflammation and in addition it is studded with small white patches about the size of a pinhead. In some cases small ulcers may form. A scraping from one of the white patches, examined with a microscope, will show the fungus (Fig. 257).

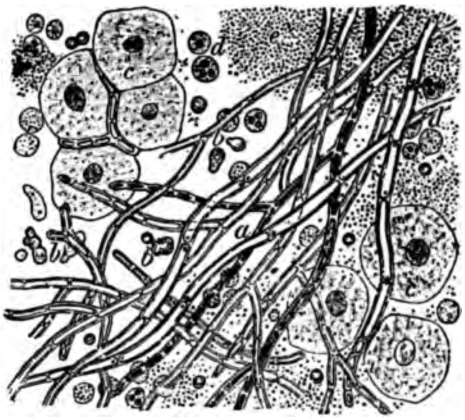


Fig. 257.—The thrush fungus, under the microscope. (Holt—*Diseases of Children.*)

Treatment.—Douches will give some relief, but must be supplemented by application through the speculum of a more concentrated antiseptic, such as argyrol 25 per cent or protargol 10 per cent or silver nitrate 5 per cent or bichloride solution (1-500). After the application, dust powdered borax into the vagina and then introduce a tampon wet in 50 per cent boro-glyceride. Such treatment, given every day or every other day for several weeks usually stops the disease. After the fungus has been destroyed, mild antiseptic douches are required for a time for the accompanying simple vaginitis.

DIPHTHERITIC VAGINITIS

Diphtheritic vaginitis is due to infection of the vaginal wall by diphtheria bacilli. It is rare. It is liable to occur when there is diphtheria in the house, if there are abrasions of the vagina, and particularly after labor.

Diphtheritic vaginitis is characterized by the development of very small patches of false membrane on the vaginal wall and by the marked systemic effects of diphtheria, in addition to the usual signs of vaginitis. Streptococci sometimes cause a membrane. The differential diagnosis is made by the surrounding inflammation and the systemic disturbances in the two diseases, and especially by a bacteriologic examination. The author recalls the case of a patient brought to the hospital with puerperal fever, in which examination showed suspicious patches on vaginal wall and cervix, and bacteriologic examination showed diphtheria.

The treatment of diphtheritic vaginitis should include the measures recommended for simple vaginitis, and, in addition, antitoxin and other remedies indicated in diphtheria.

EMPHYSEMATOUS VAGINITIS

In emphysematous vaginitis, small collections of gas appear under the epithelium or in the meshes of the connective tissues. It is a rare form of vaginal inflammation and occurs almost exclusively in pregnant women. Its seat is the upper part of the vagina and the vaginal portion of the cervix. The little air vesicles are close set and vary from the size of a pinhead to several times as large. They are frequently surrounded by an area of hyperemia, but the inflammatory reaction is slight. When punctured the air escapes and the vesicle collapses. There is rarely any secretion from them. The gas contained in them is, in part at least, trimethylamine. The vesicles show little tendency to reform after puncture. The affection is due to a mild gas-producing bacillus. But it apparently bears no relation to infection with the gas-forming bacillus known as the bacillus aerogenes capsulatus, for this deadly germ gives rise to a severe and rapidly spreading phlegmonous inflammation.

As to the treatment of emphysematous vaginitis, nothing more is usually required than puncturing the air vesicles and washing of the vicinity with an antiseptic solution. If there is an irritating discharge, mild antiseptic douches may be given. If the patient is pregnant, great care must be exercised not to cause much irritation, as an abortion might result.

ADHESIVE VAGINITIS

Adhesive vaginitis is the term given to that form of vaginal inflammation in which there is a tendency of the opposed surfaces to become adherent. It occurs almost exclusively in women past the menopause, hence the name "senile vaginitis" by which it is often designated. Occasionally it occurs in children. The predisposing cause in most cases is the disturbance of nutrition due to old age. The exciting cause is probably a slight uterine discharge, which macerates the vaginal epithelium and produces considerable irritation. A certain amount of senile vaginitis is very frequent and often produces no symptoms. In fact it is probable that only a small proportion of women over sixty are entirely free from some disturbance of this kind, with slight adhesions here and there.

Over irregular patches the superficial layers of epithelium are thrown off (Figs. 258, 259), forming erosions from which there is a scanty secretion. The eroded areas are tender and usually bleed on manipulation.

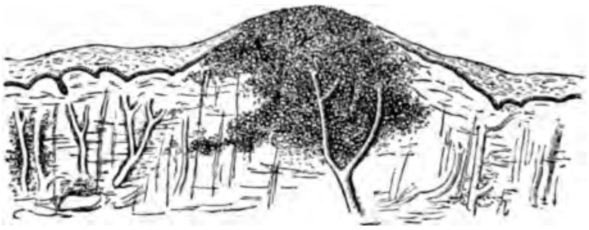


Fig. 258.—Indicating the condition in an area of adhesive vaginitis. The epithelium is thrown off. The granulating surface left may unite with a similar area on the opposite wall, causing adhesions as described. (Breisky—*Diseases of Vagina.*)

When such areas develop on opposed surfaces of the vaginal walls adhesions take place between them. For a long time the adhesion is weak and the surfaces may be easily separated. If the process of adhesion is allowed to go on undisturbed, the adhesions become organized and firm (Figs. 260, 261), and in the course of time may become so extensive and strong that the vagina is practically obliterated. Adhesive vaginitis is accompanied by a slight "gluey" discharge, small in amount but irritating.

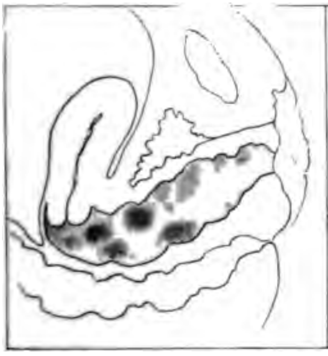


Fig. 259.

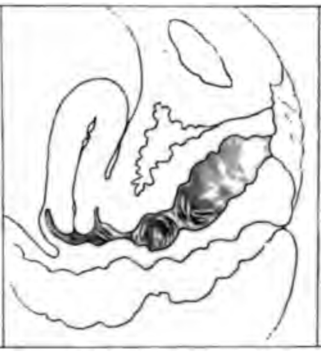


Fig. 260.

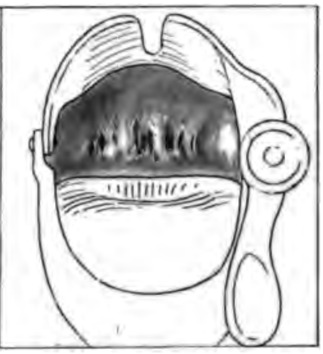


Fig. 261.

Fig. 259.—Indicating scattered areas of adhesive vaginitis.
Fig. 260.—Adhesions resulting later from adhesive vaginitis.
Fig. 261.—Appearance of adhesions through the speculum.

The **symptoms** are, vaginal discharge, sometimes bloody, with some pain in the pelvis and vaginal burning and discomfort. There may be some burning or smarting on urination, from irritation of the vulva by the discharge.

On digital examination, the vaginal walls are felt adherent in places, especially at the upper portion of the vagina, and the separation of the walls causes some pain and bleeding. Examination of the vagina through the speculum shows hemorrhagic areas of denudation and inflammation, principally in the upper part of the vagina.

Diagnosis.—The evidence of subacute vaginitis with marked tendency to adhesion of the walls in spots establishes the diagnosis of adhesive vaginitis. Vaginitis occurring after the menopause is usually of this form. Be careful to distinguish gonorrheal vaginitis from the ordinary adhesive vaginitis. Serious disease of the uterus causing discharge, particularly cancer, must be excluded.

Treatment.—If the trouble is slight and causing no symptoms, it needs no treatment. The adhesions in themselves cause no trouble and consequently need no treatment, except when they become so extensive as to interfere with coitus.

When the disturbance gives rise to an irritating discharge, to bleeding, or to pain, then the following treatment is indicated:

1. Put the patient in the best possible general health.

2. Keep the vagina free from the irritating discharge by the use of a mild antiseptic douche, such as a lysol or aluminum acetate douche, two or three times daily. If the parts are atonic and show a marked tendency to bleed, an astringent douche, such as the alum and zinc sulphate douche (see astringent douches, Chapter III) may be used.

3. Every second or third or fourth day, depending on the severity of the vaginitis, make a vaginal application of some astringent and antiseptic, for example, argyrol 25 per cent or protargol 5 per cent to 10 per cent. This should be applied thoroughly to all parts of the vaginal wall involved in the inflammatory process. If the hemorrhagic tendency is marked, an application more strongly astringent, such as copper sulphate solution (10 per cent) may be used.

After the application, some measure should be employed to keep the vaginal walls separated if the process is very severe. For this purpose may be used cotton tampons or gauze strips soaked in carbolized glycerin (2 per cent) or covered with carbolized zinc oxide ointment (2 per cent to 5 per cent), or the ointment may be spread on the vaginal walls and then the tampons introduced. Carbolized olive oil (2 per cent to 5 per cent) makes a soothing application to the vaginal walls and prevents adhesion of the opposed surfaces. In very sensitive cases, either almond oil or unguentum aquae rosae may give more relief than the other remedies mentioned. For use at home, between the office applications, the aluminum acetate douche (teaspoonful of the powder to two quarts of hot water) is very satisfactory.

4. The exciting cause of the trouble must be sought and, if possible, removed. Frequently it will be found to be an irritating discharge due to senile endometritis, which must, of course, receive appropriate treatment.

EXFOLIATIVE VAGINITIS

There is a rare form of nutritive change in which the superficial portion of the vaginal mucosa is thrown off as a cast. This exfoliation may occur repeatedly and periodically.

SIMPLE ULCERS

OF VULVA AND VAGINA

Ulcers or ulceration of the vulva or vagina may indicate the following conditions:

1. Simple irritation or pus infection. Any of the numerous irritants that cause vulvitis may cause one or more ulcers, as may also infection at any point with ordinary pus germs.
2. Chancroidal infection.
3. Syphilis.
4. Tuberculosis.
5. Granuloma Inguinale.
6. Malignant disease.
7. Ulcus rodens vulvae.

Those coming in the first class constitute the simple ulcers.

Pathology and Symptoms.—The simple ulcers are the ones considered here—the other varieties will be taken up later. The essential feature of an ulcer is that the epithelial coat is lost down to the connective tissue, the base being covered with granulation tissue or a slough. The infecting germs lie in the tissues close to the surface of the ulcer, and outside them is a limiting zone of round-cell infiltration. There is more or less discharge from the surface of the ulcer, and it usually bleeds on slight manipulation. These characteristics pertain to all varieties of ulcer. There is some pain and tenderness about the ulcer, and the discharge may cause considerable irritation. If the ulcer is situated so that the urine flows over it, the patient may experience smarting and burning on urination.

Diagnosis.—The diagnosis of ulcer presents no difficulties, as it is established by finding an area devoid of epithelial covering presenting a granulating surface. An eroded area on the vulva or in the vagina, which is sensitive and bleeds easily, may be mistaken for an ulcer, but close inspection will show that the surface is still covered with a thin layer of epithelium.

The diagnosis of the **variety of ulcer** present is very important and sometimes difficult. From simple ulcer there must be distinguished the chancroidal, the syphilitic, the tuberculous and the malignant ulcer.

The **chancroidal ulcer** presents a ragged or irregular base with punched-out or undermined edges, and a tendency to spread and also to infect surfaces with which the secretion comes in contact (Fig. 262). The chancroidal ulcer appears within a few days after suspicious coitus. It is tender and sometimes quite painful, and is liable to be accompanied with painful inguinal adenitis, in which the glands become matted together and later suppurate.

There is no marked induration underlying the sore—it is a "soft sore." On account of the infective character of the secretion, other ulcers appear, and frequently the ulcers of the vulva are complicated by ulcers about the anus. It often happens that these lesions about the anus give rise to more troublesome symptoms than the vulvar ulcers and are really what cause the patient to seek relief.

Syphilitic Ulcers are of two kinds, the primary lesion, called also "chancre" or "hard sore," and the deep tertiary ulcers. The characteristic primary sore of syphilis becomes apparent two to four weeks after suspicious coitus. It is small and not particularly painful, but presents an underlying area of induration which feels to the examining fingers as though a small piece of stiff paper were lying beneath the ulcer. The inguinal adenitis, which appears after a short time, is practically painless and there is no tendency to suppuration or to matting together of the glands. The superficial secondary lesions, which about the vulva appear as flat condylomata, are not really ulcers but simply erosions. The ulcers appearing in the later stages of syphilis are usually ragged, irregular, indolent and persistent, and there are other evidences of syphilis. In a doubtful case, a course of potassium iodide may assist in clearing up the diagnosis.

By a bacteriologic examination of a piece of tissue excised from the lesion, a positive diagnosis may be made at once, in the primary or secondary or tertiary stage of the disease (see under Syphilis).

In **tuberculous ulcer** there may be other organs presenting tuberculosis. Also, the nature of the ulcer is indicated by its appearance, by finding tubercle bacilli in the discharge or scrapings and, if still doubtful, by the examination of sections of tissue from the margin of the sore.

In **malignant ulcer**, that is, an ulcer due to the breaking down of tissue infiltrated with carcinoma or sarcoma cells, there is a surrounding area of induration, representing that portion of the malignant infiltration which has not yet broken down. A malignant ulcer is chronic and bleeds easily, and the tendency to bleed is not checked, but rather increased, by the application of 10 per cent copper sulphate solution. In the case of a chronic ulcer of doubtful character, a piece of the margin of the ulcer should be excised for microscopic examination. Carcinoma in this situation causes death in about two years. To remove the growth completely, the operation must be performed in a very early stage, hence the importance of an early diagnosis.

Treatment.—The first efforts in the treatment of any ulcer of the external genitals should be directed toward securing cleanliness and allaying irritation, by the measures recommended under Acute Vulvitis. In simple ulcer, after cleansing with lysol solution and drying with absorbent cotton, the patient may apply an antiseptic ointment, such as carbolized vaseline (1 per cent) or the chloretone ointment. This cleansing, followed by the application of the ointment, may be carried out two or three times daily by the patient at home, or more frequently if there is much discharge. A very efficient cleansing application for the patient's use is hydrogen peroxide. Every few days apply some astringent, such as protargol (10 per cent) or

silver nitrate solution (10 per cent) or copper sulphate solution (10 per cent), to all portions of the surface of the ulcer, and after that an astringent antiseptic powder. The genitals should be kept covered with a piece of absorbent cotton held in place by a T-bandage. If there is an accompanying vaginal discharge, the patient should take an antiseptic douche one to three times daily. If these cleansing and antiseptic measures do not cause the ulcer to heal promptly, it is probably not a simple ulcer but belongs to one of the special varieties.

CHANCROID

OF VULVA AND VAGINA

Chancroid is an infectious ulcer, entirely local in its effects and due to inoculation with secretion from another chancroid. It is known also as "soft chancre" and as "soft sore." It constitutes one of the three so-called "venereal diseases" (gonorrhea, chancroid, syphilis).

It is due to a specific infectious agent which causes chancroid and nothing else. It is invariably due to contact with virus from another chancroid, and sexual intercourse is nearly always responsible for this contact.

The infectious principle of chancroid is much more exclusively conveyed by sexual intercourse than syphilis. Conversely, chancroidal virus is much less liable than syphilitic virus to be conveyed in an active state simply by contaminated articles. However, such method of conveyance is probably possible and must be guarded against. The chancroidal virus does not penetrate healthy epithelium but makes its entrance through a crack or abrasion.

The infectious agent is a short bacillus, discovered by Ducrey and hence designated as the **Ducrey bacillus.** It occurs in the discharge, but cannot be satisfactorily identified there because of contaminating material. For diagnostic examination a **tissue specimen** should be secured.

In the case of enlarged glands, the **serum** secured by puncture with a large hollow needle is usually satisfactory for diagnostic examination.

Pathology

Within twenty-four to forty-eight hours after infection, there appears a small pustule on an inflammatory base. This point of infection may be situated at any part of the external genitals or in the vagina. This beginning lesion may not be noticed by the patient, so that according to her statement the lesion may not have appeared for several days or a week after coitus. In a short time the epithelial covering over the infected spot is lost and a small ulcer is thus formed. This ulcer has sharp, punched-out margins, a rough and sometimes necrotic base, is surrounded by a red inflammatory zone and is accompanied by more or less inflammatory edema. In cases of long standing or of much inflammation, there may be considerable round-cell infiltration and induration around the ulcer and under it, but there is rarely if ever the marked parchment-like or cartilage-like induration that develops under the primary lesion of syphilis.

Usually the ulcer gradually enlarges and deepens, the destruction as a rule being more rapid and extensive in the vagina than on the external surface. During this stage the base of the ulcer usually shows sloughing tissue or false membrane, and the surrounding inflammatory zone is marked. Alcoholic drinks, friction from exercise and also uncleanliness, increase and prolong the destructive action. Ordinarily after several days, the time depending somewhat on the patient's habits and general health, the ulcer shows a tendency to heal. Under treatment, the base clears off and shows apparently healthy granulation tissue, the surrounding inflammatory zone grows less and the secretion becomes more like ordinary pus. Gradually the granulating surface is replaced by a thin layer of scar, which begins at the margin and progresses towards the center. The usual duration of a chancroid is two to three weeks. A relapse may occur at any stage of the healing process and even when apparently healed, the lesions are for some time infectious.

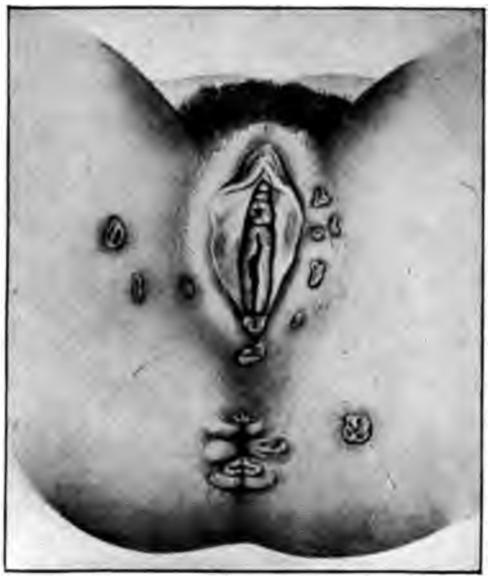


Fig. 262.—Chancroidal ulcers of the vulva. (Bovée—*Practice of Gynecology.*)

Such is the regular course of a chancroidal ulcer, but several other conditions may develop, as follows:

a. In chronic alcoholics and other subjects of diminished resistance, the ulcer may present ragged and undermined edges and become very destructive and rapid in its advancement, constituting what is known as a **phagedenic chancroid.**

b. Any surface which lies against a chancroid is liable to develop a secondary chancroid at the point of contact, after sufficient time for the irritating discharge from the primary chancroid to cause an erosion and thus open an avenue for infection. Again, if pus from a chancroid comes in contact with a scratch or abrasion in the vicinity, it causes another chancroid. This is called **autoinoculation** and it is one of the marked characteristics of chancroidal lesions in contradistinction to the syphilitic chancre. It is also one of the strong proofs of the purely local character of chancroid. On account of this property, chancroids are usually multiple. There may be two or three or there may be many (Fig. 262). Frequently the secretion runs down over the anus, where it comes in contact with abrasions and causes chancroidal ulcers that are more painful than the vulvar lesions. Sometimes the infective secretion penetrates the hair follicles or sebaceous glands of the vulva, forming small round sores called follicular ulcers.

c. Not infrequently the virus is carried by the lymphatics to the inguinal glands and there causes **chancroidal bubo** which usually suppurates and gives rise to a discharge, which is as infective as that from the original ulcer. Of course, ordinary pus germs accompany chancroidal inflammation, and the ordinary pus germs may cause a simple bubo, not containing any chancroidal virus. Such a bubo would not, of course, be a chancroidal bubo, but would be a simple bubo accompanying a chancroidal ulcer. It is not settled just what proportion of buboes are of this class.

d. It sometimes happens that syphilitic infection takes place at the same time as the chancroidal infection or just before it or after it. This constitutes a **mixed infection** which not infrequently causes a mistake in diagnosis and much chagrin on the part of the physician, who sees unmistakable evidences of syphilis develop from a sore which he had pronounced simply a chancroid. For the first two or three weeks there may be nothing to indicate that syphilitic infection has taken place, but after that time the ulcer, instead of cicatrizing as a chancroid should do, develops the induration and other characteristics of a syphilitic sore. This mixed infection occurs rather frequently and its possibility in any particular case must be kept in mind, that due caution may be exercised in giving the diagnosis and prognosis.

Symptoms

There may be few or no symptoms, except when the ulcer is touched or rubbed by the clothing. In some cases the patient complains only of a discharge and smarting on urination. She may be unaware that any sore is present on the genitals. On the other hand, the patient may complain of much itching and of other symptoms of acute vulvitis due to the irritating discharge. If the ulcer is so situated that the urine flows over it, there is usually considerable smarting and pain on urination. When situated in the vagina, the ulcer gives rise to an irritating discharge, frequently blood-streaked, and also to other symptoms of vaginitis.

In multiple chancroids, the discomfort is accordingly increased, and in phagedenic chancroid the general health may be seriously impaired. In chancroids about the anus, there is much pain, particularly on defecation, and occasionally the excruciating pain of anal fissure appears.

If infection of the lymphatic glands takes place, the patient complains of pain in the affected groin, increased by walking, and of a tender lump in the groin. The conditions found on examination of a chancroidal ulcer have been described under pathology. In the case of mixed infection, symptoms of secondary syphilis develop after sufficient time has elapsed.

Diagnosis

The diagnosis of chancroid is based on the following points:

1. Development within a few days or a week after suspicious coitus.
2. Location and mode of development and appearance of the lesion.
3. Two or more lesions, indicating autoinoculation.
4. Absence of parchment-like, or cartilage-like, induration under the ulcer.
5. Presence of a painful bubo tending to suppuration.
6. In a doubtful case, a piece of tissue may be excised from the involved area, and submitted to a bacteriologic examination, to establish the presence or absence of the Ducrey bacillus.

A SIMPLE ULCER may be due to an abrasion in the first intercourse after marriage, or to infection of a denuded point with ordinary pus germs. A simple ulcer is not so exclusively associated with coitus, does not give rise to so much inflammatory reaction or exhibit such an angry appearance, does not show such a tendency to spread and destroy tissue. If kept clean for a few days, it shows healthy granulations and healing edges, is more liable to be single (as autoinoculation is not so frequent) and involvement of the lymphatic glands with suppuration is rare.

In HERPES, the abrasion is preceded by a vesicular eruption and there are usually several lesions close together or joined. The lesion is very superficial, the red surface being still covered with a thin layer of epithelium. The margin is small and regular and there is but little inflammatory reaction.

It must not be forgotten, however, that an herpetic lesion may afford entrance to ordinary pus germs or to chancroidal virus or to syphilitic infection, in which case characteristic signs will develop in due time. For the distinguishing characteristic of syphilitic lesions and tuberculous ulcer and malignant ulcer, see the succeeding pages.

Treatment

The treatment for chancroid is thorough cauterization, to destroy the chancroidal virus. The earlier this is done the fewer ulcers there will be and the less chance of suppurating bubo.

Carbolic acid (95 per cent) is the preferable cauterant in the cases where the ulcer is comparatively superficial. No general anesthetic is necessary.

The ulcer is cleansed and then covered with a pledget of cotton soaked in 20 per cent cocaine solution, which is left in place five minutes. Then remove the cotton and cleanse the surface of the ulcer again. Then cauterize every portion of the ulcer with the carbolic acid. For applying this, a toothpick with a few shreds of cotton wound firmly on the end of it, is very convenient, or a cotton-wrapped applicator may be used. If any of the carbolic acid should touch the skin, an immediate application of alcohol will stop destructive action.

Rub the carbolic acid into every crevice and irregularity of the ulcer, removing any soft granulations and working the cauterant into the depth of the affected area. When the surface has been thoroughly cauterized then apply alcohol to stop further action. Then cleanse the ulcer and apply some soothing ointment. Vaseline or carbolized vaseline does very well.

The patient should keep rather quiet (lie down most of the time if she can) for a few days. She should cleanse the parts frequently with the carbolic wash or other antiseptic wash and dry with cotton and apply the vaseline or other ointment. There is some reaction, but that subsides after a few days, and the ulcer begins to show healthy granulations and rapid healing. After that the treatment is the same as for a simple ulcer.

In cauterizing the ulcer it is important that every particle of the infected surface should be thoroughly cauterized, for if active virus is left at any point, it will reinfect the enlarged ulcer after the sloughs from cauterization separate.

The advantage of carbolic acid over nitric acid or the thermo-cautery is that it is less painful. It has an anesthetic effect that lasts for some time after the cocaine anesthesia has disappeared. If the ulcer becomes very painful from the reaction following cauterization, hot applications may give much relief.

In **phagedenic chancroid** cauterization is the most effective treatment. The cauterization must be thorough, extending into every irregularity of every chancroidal lesion present, for if active virus is left at any point it will reinfect the enlarged ulcers left after the sloughs separate. If the chancroidal ulceration is extensive or if there are sinuses or if there are severe anal lesions, it is best to give the patient a general anesthetic, that sinuses may be laid open freely and all lesions carefully cauterized. After cauterization, there is left a simple ulcer which usually heals rapidy under the ordinary cleansing and antiseptic treatment previously given. If the granulations become sluggish, they may be stimulated by the application of silver nitrate solution (5 per cent to 10 per cent) or copper sulphate solution (10 per cent to 25 per cent). The copper sulphate is especially indicated where there is any hemorrhagic tendency. If the granulations are persistently unhealthy, they may be cleared away with the sharp curet and the surface then stimulated to healthy action, as above indicated.

The **treatment of chancroidal adenitis,** and of suppurative buboes in general, has been the subject of much thought and experimentation.

Of first importance is prophylaxis. The most certain means of preventing a bubo is to secure rapid healing of the genital sore. This is one of the strong points in favor of cauterization of chancroids, for thorough cauterization, probably more than any other one measure, checks the infective process and causes rapid healing.

When soreness in the groin with some enlargement of the glands is noticed, the patient should be put to bed and kept there, and COMPRESSES wet in the lead and alum lotion (alum 1 part, liquor plumbi subacetatis 1 part, and aquae 100 parts) may be applied to the affected region. A piece of absorbent cotton is moistened with this solution and then applied over the affected glands and held in place by a bandage so arranged as to make rather firm pressure on the glands. A "spica" bandage is the form usually used. The dressing should be renewed two or three times in the twenty-four hours, depending on the intensity of the inflammation. Spitschka, who originated this treatment, regards it as by far the most effective abortive treatment in the first stage of adenitis, much more so than applications of tincture of iodine or poultices or the ice bag. Under this treatment the pain usually subsides rapidly, and frequently suppuration is prevented. If dermatitis results, the solution may be weakened or discontinued, a soothing ointment being then applied.

INUNCTION of half a teaspoonful of mercurial ointment over the tender glands once daily for a few days is another measure which seems to prevent suppuration, but mercurialization must be guarded against. The ointment is rubbed in over the swollen glands, then cotton is applied, and over all a firm spica bandage. The bandage should be applied firmly enough to make considerable pressure on the glands. The dressing may be changed once or twice daily.

If after a few days' trial of one of the above measures, the adenitis is still increasing, the time for INTRAGLANDULAR INJECTION has arrived. Many solutions for injection have been tried with benefit. Probably the best injection-solution is the 1 per cent solution of benzoate of mercury, recommended by Welander. With an ordinary hypodermic syringe, five to ten drops of this solution are injected into each of the enlarged glands, the skin having, of course, been thoroughly disinfected. The needle may be entered at several points, if necessary to reach the various glands. The total amount of solution injected should not exceed twenty or thirty drops. The injection causes considerable reaction, as evidenced by pain and swelling and some fever. After two or three days, the irritation subsides and usually resolution takes place, if the buboes were not fluctuating at the time of injection. If one injection is not sufficient, another may be made after several days, even though fluctuation is present.

If the evidence of fluid persists several days after all irritation from the injection has subsided, the abscess should be opened by INCISION and the incision kept open by a strip of antiseptic gauze, and the cavity treated in the ordinary way with peroxide and bichloride solution.

Some cases presenting fluctuation have been cured by injection. Even when incision later is necessary the injection seems to be beneficial in three ways:

a. The glands opened after injection rarely show chancroidal ulceration, but heal as simple abscesses.

b. Complete liquefaction of all involved tissues is more frequent, so that deep curetting or extirpation of partially broken-down glands is rarely necessary.

c. Other glands are seldom involved after the injection of those first affected, consequently many glands are saved and an extensive scar avoided.

The most certain and rapid method of curing a chancroidal bubo in an early stage is to COMPLETELY EXCISE the affected glands and close the wound immediately by sutures. However, only a small proportion of patients will submit to this radical treatment, particularly in view of the fact that many buboes recover without suppuration.

After the bubo has resisted abortive measures several days, suppuration is very probable and complete extirpation may then be urged with more force. Most patients, however, prefer the less radical injection method and some object even to that, insisting on simple external applications to relieve the pain and incision later when necessary.

A **chancroidal sinus**, persisting from a bubo, may be injected with iodoform in glycerin (10 per cent) once daily, after washing out with peroxide. If this does not cause the sinus to heal it may be curetted with a small curet under cocaine anesthesia. If it still persists there are probably broken-down glands that must be completely extirpated under a general anesthetic, before healing can take place.

SYPHILIS

OF VULVA AND VAGINA

Syphilis is a general infectious disease, characterized by an initial sore (the point of entrance of the infecting germ) and by general secondary manifestations after several weeks and by tertiary lesions, localized in various parts of the body, usually only after several years.

The infectious agent is the **Spirochete pallida**, a very small microbe which is found in all lesions (primary, secondary and only rarely in tertiary). The demonstration of this germ, by proper staining methods or by examination in the dark-field, makes possible a positive diagnosis of syphilis at once, even in the primary stage and long before the positive clinical evidences appear. The positive identification of this infectious germ requires considerable bacteriologic experience, hence the specimens should be sent to a pathologist.

The directions for preparing specimens are as follows:

In case of a suspected PRIMARY LESION (chancre), wipe the surface of the ulcer with cotton or gauze thoroughly, avoid causing bleeding. From the "irritation serum" which results, make a **spread-preparation** on a slide or cover-glass, just as in making a preparation of blood. Half a dozen specimens are made and dried and then packed for transmission.

In SECONDARY LESIONS (mucous patches, moist papules, dry papules), a spread-preparation of the "irritation serum," made as above directed, will usually suffice for a diagnosis. A negative finding, however, does not certainly exclude syphilis. Consequently, to make the diagnosis certain, a **tissue specimen** should be examined. This is easily secured by clipping off a small papule. Preserve all tissue specimens to be examined for the Spirochete pallida, in 10 per cent formol solution. Specimens preserved in alcohol do not stain so well.

In TERTIARY LESIONS only **tissue specimens** can be used for diagnosis, and they must be taken from the capsule, or tissue about the gumma. The gummatous material, or necrotic material in the center of a "gumma," is not suitable for the search for spirochetes.

Syphilis may be hereditary or acquired. In the hereditary form the lesions of the genitals either constitute only a small part of the general syphilitic picture, as in the severe cases leading to death of the infant, or appear as ordinary tertiary lesions later in life. Consequently hereditary syphilis requires no special consideration in this connection. Acquired syphilis is due to inoculation of a crack, scratch or abrasion with secretion from a syphilitic sore or with syphilitic blood.

In the case of a primary sore of the vulva or vagina, there has, of course, been contact of the genitals with the syphilitic virus, either by sexual intercourse, which is the more common way, or by contact with contaminated clothing or fingers or household utensils or bath-room articles (particularly the water-closet seat in public places). In the case of secondary or tertiary lesions of the genitals, the primary lesion may have been on the genitals or on any other part of the body.

Pathology, Symptoms, Diagnosis

Syphilis of the vulva or vagina may appear in the form of primary or secondary or tertiary lesions.

Primary Lesions.—For a period of two to three weeks after infection with syphilitic virus, there is nothing to indicate that such infection has taken place. The small abrasion, through which the infection took place, heals in a few days as though nothing had happened and there is apparently no morbid process going on there. This is known as the "first incubation period." In exceptional cases it may be less than two weeks or more than three weeks, sometimes extending to six or even eight weeks.

At the end of the incubation period a papule appears at the point of infection. If the virus entered at two or three points, there may be a like number of lesions, but this is exceptional. The small red papule is the usual form which the initial lesion takes. The papule may be decidedly elevated and pointed, or it may be flat and scarcely raised above the surface, but in either case some induration, slight at first, may be felt.

If this papule is situated on the external surface and is kept dry, it remains simply as a dry papule with some scaling but no ulceration. This form of primary lesion is known as the **dry scaling papule.** It enlarges peripherally and may vary in size from a pea to a dime. Exceptionally, the flat papule may grow to the size of a silver quarter.

The **induration** also increases, and at the end of a week or ten days is characteristic. The best way to feel this induration is to grasp the lesion between the thumb and finger and gently squeeze it or, more accurately, squeeze the tissues beneath it. The induration assumes two forms. It may be present as a thin dense layer under the papule or ulcer. When grasped as just indicated, such form of induration gives the sensation of a small piece of thick writing-paper or stiff blotting-paper lying horizontally under the lesion. The margins are quite distinct and, when pressed, the plate of induration can be felt to bend much as a piece of blotting-paper would. This is called "parchment induration." On the other hand, the induration may be present as a thick rounded mass, occupying the base of the papule or ulcer and extending a considerable distance below it. This area of induration is in the form of a nodule which is dense and firm and presents distinct outlines. When examined by grasping, as before described, it gives the impression of a piece of cartilage beneath the sore and is known as "cartilaginous induration," called also "nodular induration."

The induration of a syphilitic chancre disappears very slowly. When well marked it persists through the second incubation period, i.e., until the development of secondary symptoms, and then gradually undergoes involution. As a rule, the primary lesion with its accompanying induration, disappears completely within six to eight weeks after the beginning of the secondaries. Frequently some induration or a pigmented spot marks the cite for several months longer, and occasionally the indurated tissue becomes somewhat organized and persists indefinitely as a small hard nodule of scar-tissue.

Another form of primary lesion is the **superficial erosion.** This is noticed as a small round or oval red spot which may or may not be slightly raised. The center is often slightly depressed. The top layers of epithelium over this spot have been thrown off, forming a superficial abrasion. A thin gray film usually occupies the center of the lesion and in many cases covers all of it. The characteristic induration is present.

A third form of initial lesion is the **indurated ulcer.** If either the dry papule or the superficial erosion lose all their epithelium, so that granulation tissue forms, there is an ulcer with an indurated base. This transformation is especially liable to take place when the lesion is kept moist, hence it is most frequently met with in the vagina or on the inner surfaces of the labia. It may, however, occur in any situation, and in many cases the ulcer is apparently present almost from the beginning. This indurated ulcer was the first form of primary lesion recognized as indicating infection from syphilis, and to it were given the names "hard chancre" and "hard sore" and "Hunterian chancre."

Any of the three forms of primary lesion may be small or large. Unless accompanied with pus infection, they give rise to very little pain or disturbance, and if small may be overlooked entirely by the patient. Many women presenting unmistakable evidences of syphilis can give no history of a primary sore because it escaped their notice. This is especially liable to occur if the lesion is situated in the vagina. Furthermore, a small primary lesion in the vagina may, after a short time, disappear so completely that even the physician can find no trace of it.

There is a fourth form of primary lesion, and that is the mixed sore. By a "mixed sore" is meant a sore with a double infection—both chancroidal and syphilitic, the former disease being manifest first, and the latter, two to four weeks later. At first the sore is apparently an ordinary chancroid, but after

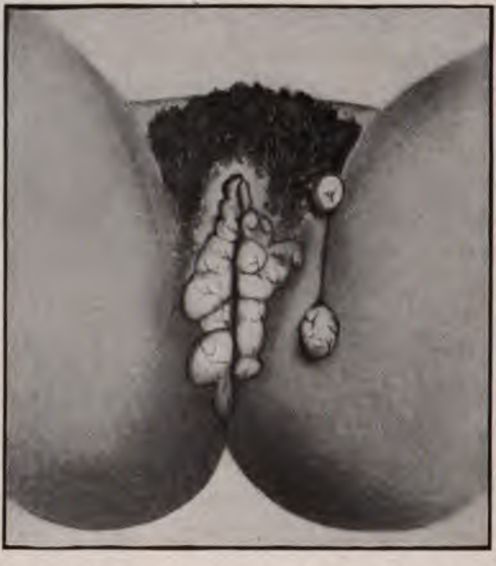


Fig. 263.—Syphilitic condylomata. (Bovée—*Practice of Gynecology.*)

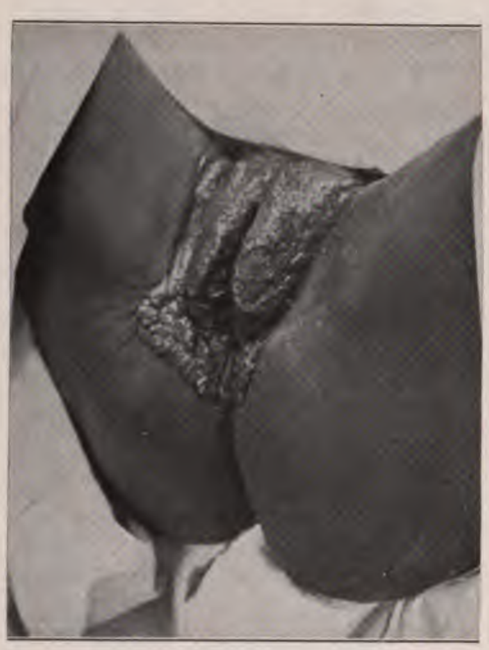


Fig. 264.—Syphilitic infiltration and condylomata about the vulva. (Hirst—*Diseases of Women.*)

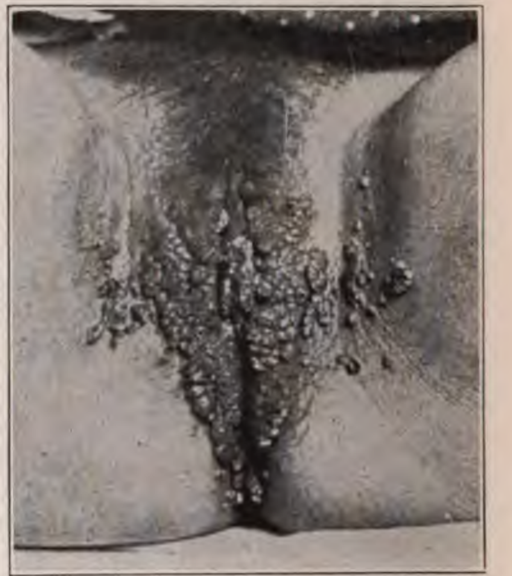


Fig. 265.—Syphilitic condylomata. (Ravogli—*Jour. Am. Med. Assn.*)

two or three weeks the sore loses its chancroidal characteristics, induration appears under it and an ordinary hard chancre develops, to be followed by other evidences of syphilis. In other cases, the chancroidal ulceration heals during incubation of the syphilitic germ, but at the end of that period the scar becomes indurated, perhaps ulcerated, and a primary syphilitic lesion appears.

A primary syphilitic ulcer does not present the angry appearance and destructive characteristics of the chancroidal sore. It is apparently a much less virulent sore. The edges are not undermined, but slope inward, there is not such a marked zone of inflammatory reaction, and the ulcer does not spread so rapidly or so persistently. It is more indolent and frequently is nearly painless. In fact, the absence of pain, such as would ordinarily be expected from the size and location of the sore, is one of the striking characteristics of syphilis. But any syphilitic lesion may become infected with ordinary pus germs, in which case it usually becomes painful. The primary sore may heal within a week or two after its appearance, or it may persist all through the second period of incubation.

The primary syphilitic lesion of the external genitals is accompanied by enlargement and induration of the inguinal glands on the same side as the lesion. This enlargement may be marked or it may be slight, but it is always present. It begins in a week after the appearance of the primary lesion. It is due to an indolent inflammation or induration of the glands. Several glands are affected and they may be felt as distinct painless nodules, entirely separate and freely movable. Unless there is a mixed infection, with chancroidal virus or with ordinary pus germs, the glands do not present any evidence of acute inflammation and there is no suppuration.

Secondary Lesions.—On the vulva, secondary syphilis usually manifests itself by the development of moist papules, called also "condylomata lata" Figs. 263 to 265). These may appear any time during the first twelve months of the secondary period. The syphilitic condyloma consists of a slightly elevated, flattened area from which part of the epithelial covering has been thrown off. It may be any size from the head of a pin to as large as the thumb-nail. There are usually several lesions and in some cases dozens of them. The individual lesions have a fairly regular circular or elliptical outline. Several of them may coalesce, forming large irregular infiltrated patches (Fig. 263). In some cases there is a slight secretion, and all of them are kept moist a portion of the time by the secretion from the vagina. They are not painful and cause very little disturbance, except when irritated.

When the vaginal discharge is very irritating, some of the lesions may become inflamed, in which case they are reddened and angry-looking and painful. When inflamed, the thin epithelium may be lost, giving rise to an ulcer which may involve a part or all of the lesions. Sometimes abrasions on the lesions are caused by scratching.

The favorite locations for the moist papules or flat condylomata, are the labia minora and the inner surfaces of the labia majora. In some cases, however, they cover all the external genitals and extend even on the adjacent surfaces of the thighs.

Associated with them are other evidences of secondary syphilis, such as a general eruption, enlargement of the inguinal and epitrochlear and postcervical glands, persistent sore throat, sores in the mouth and loosening of the hair.

Tertiary Lesions.—Tertiary syphilis of the vulva and vagina usually presents itself in the form of persistent ulceration (Figs. 266 to 270). When occurring in the vicinity of the vestibule, it not infrequently leads to destruction of the urethra. Its victims are usually in a state of poor health and lowered vitality. They have little tissue resistance, hence the destructive action of the ulcer. Coincident ulceration of the rectum, with stricture formation, is frequent. When syphilitic ulceration affects the upper part of the vagina or the cervix uteri it may be mistaken for cancer.

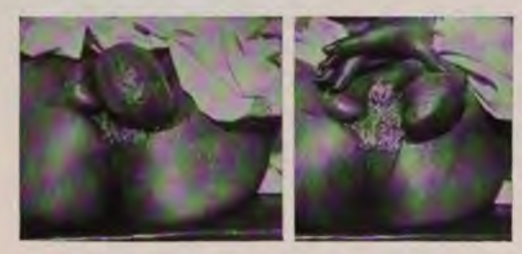


Fig. 266.—Syphilitic ulceration of vulva, with resulting stasis hypertrophy. Two views of the condition. (Gallagher—*Surg. Gynec. and Obst.*)

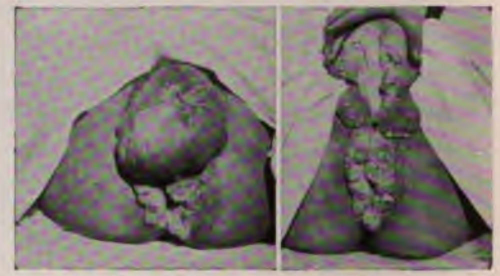


Fig. 267.—Syphilitic ulceration of vulva, with resulting stasis hypertrophy. Two views of the condition. (Gallagher—*Surg. Gynec. and Obst.*)

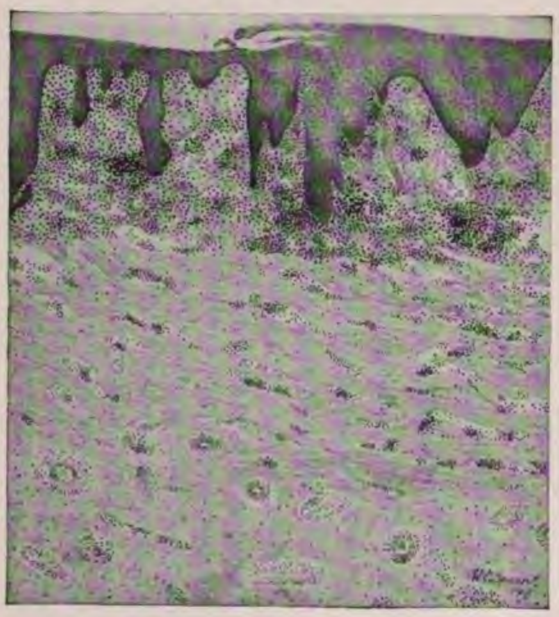


Fig. 268.—Syphilis of vulva, microscopic section. Low power. Notice epithelial proliferation and areas of round-cell infiltration. (Gallagher—*Surg. Gynec. and Obstet.*)

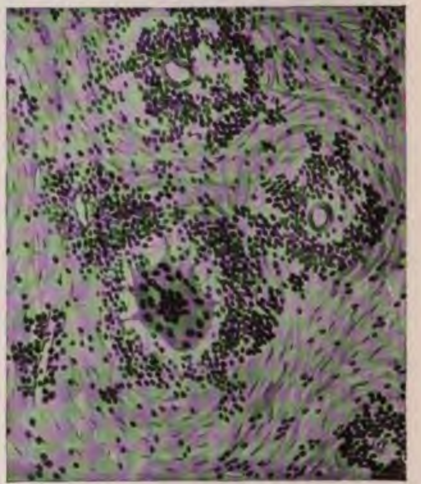


Fig. 269.—Syphilis of vulva. High power, showing giant cell.

A tertiary syphilitic ulcer is usually indolent, comparatively painless and persistent in spite of local treatment. There are usually other evidences of tertiary syphilis or a history of previous secondary or tertiary symptoms. The ulceration heals under antisyphilitic treatment, provided the patient's vitality is not so lowered that the normal tissue resistance is destroyed.

The diagnosis of tertiary syphilitic ulcer is made principally by the presence of other evidences of syphilis, by the exclusion of other forms of chronic ulceration (chancroid, tuberculosis, cancer), by the effect of treatment and by the Wassermann reaction. In the case of persistent ulcer, of doubtful character, a piece of the margin of the ulcer should be excised for microscopic examination.

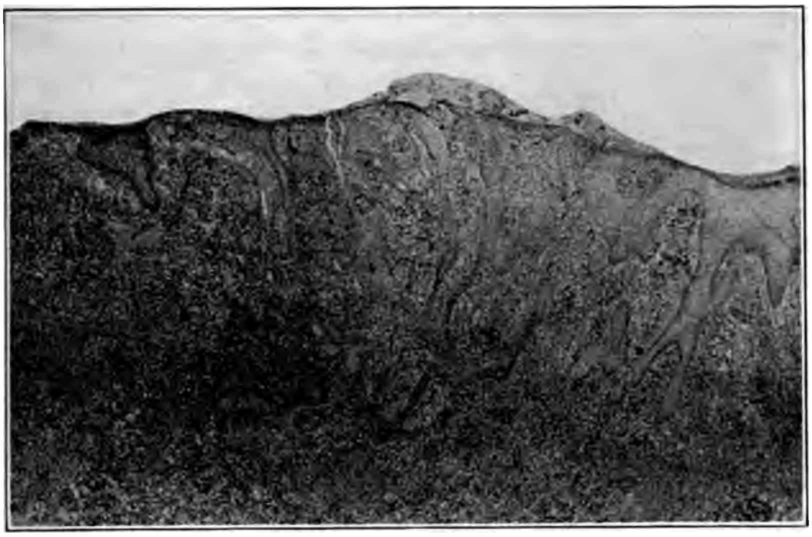


Fig. 270.—Syphilis of vulva. Microscopic section, showing very marked epithelial prolongations into the underlying tissues. Gyn. Lab.

Treatment

A patient should not be given constitutional treatment for syphilis until the diagnosis is positive. As a rule a positive diagnosis before the appearance of the "secondaries" is not possible by the ordinary clinical evidences, not even by the Wassermann reaction, which at this time still may be negative. By bacteriologic examination, however, a positive diagnosis may be made at once, even in the very earliest stage of the primary lesion, when typical spirochetes are present.

When the diagnosis is thus made early, it is recommended by some authorities that the primary lesion be at once completely excised—not with the idea of preventing general syphilis, but to modify it and lessen the effect of the succeeding stages. This excision treatment of the primary lesion is still experimental.

Otherwise the only treatment that the primary lesion requires is local cleansing and antiseptic measures, such as are recommended under Simple Ulcer. The secondary and tertiary lesions require regular constitutional treatment for syphilis, i.e., salvarsan (606) or mercury in the secondary stage, iodides and tonics in the tertiary stage and a combination of the two in the intermediate stage (late secondary and early tertiary). For the details of the internal treatment of syphilis the reader is referred to works treating of that subject.

The local treatment for the secondary and tertiary lesions of the vulva and vagina, is simply cleansing and antiseptic and astringent, i.e., the same as for Simple Ulcers. Argyrol (25 per cent), protargol (10 per cent), silver nitrate (2 per cent to 10 per cent) are excellent applications for mucous patches. Calomel as a dusting powder is also useful in relieving the irritation. These applications are likewise beneficial in tertiary ulcers. For cleansing all the irregularities of a deep ulcer, hydrogen peroxide is effective. When there is a tendency to bleed, copper sulphate solution (10 per cent) may be used.

Ravogli highly recommends emplastrum hydrargyri as an application in tertiary syphilitic ulcerations. Wash the ulcer with bichloride solution (1-2000) and then apply the emplastrum hydrargyri. This causes temporary increase in the discharge due to the breaking down and discharge of the unhealthy granulations and detritus at the bottom of the ulcer. After a few applications healthy granulations appear and healing begins. After that the ulcer is given ordinary antiseptic treatment, i.e., it is washed with bichloride solution or hydrogen peroxide, or both, and then dusted with an antiseptic powder.

TUBERCULOSIS OF VULVA

Tuberculosis of the vulva is the term applied to those lesions of the external genitals produced by tubercle bacilli (Figs. 271, 272). Tuberculosis of this region and other forms of persistent vulvar ulceration were formerly described together under the terms "lupus vulvae," "lupus hypertrophicus," "lupus perforans," "ulcus rodens," "destructive ulcer of vulva," and "perforating ulcer of vulva." As the pathology of the various forms of ulceration was gradually worked out, it was found that in many of the cases of destructive ulceration, tubercle bacilli were present. The tubercular lesions were then formed into a class by themselves and this class includes a large number of the cases of persistent ulceration formerly described under the titles above mentioned.

Tuberculosis of the vulva is due to local infection with the tubercle bacillus. The infection may take place through an abrasion, in which case the infecting germ may be brought to the abrasion by a tuberculous discharge from the uterus or vagina, or possibly by coitus with a husband having a tuberculous lesion of the genitourinary tract or by fingers or clothing infected with tuberculous discharge either from the patient or from some other person.

On the other hand, tissues may, in rare cases, be infected without any break in the epithelial covering. In such a case the tubercle bacilli may come by way of the blood or lymph.

Tuberculosis of the vulva begins as a small nodule, usually situated near the meatus or the clitoris or at the posterior commissure. It may be of a dusky red or bluish color. Microscopic examination of such a nodule shows the usual round cell infiltration, the necrotic areas, the giant cells and the tubercle bacilli, found in tuberculous lesions elsewhere. There may be only a single nodule or there may be many. After a time the nodules break down and form small ulcers. The ulcers have hard margins and an irregular base and are very liable to have an area of irregular infiltration about them. The ulcers discharge some, and this discharge may or may not show tubercle bacilli. As the ulcers enlarge they coalesce, forming extensive areas of ulceration of very irregular outline (Figs. 271, 272). As the ulcer extends at one part it may heal at another, giving rise to much scar tissue. By gradual contraction the scar tissue interferes with the local circulation of the blood and lymph and may lead to marked stasis hypertrophy and induration of the labia and clitoris.

Tuberculous ulcers are chronic and persistent and may extend deeper and deeper until fistulous openings are formed into the rectum or bladder or urethra, hence the name perforating ulcer. Even when adjacent cavities are not opened, the ulcers, in conjunction with the contracting scar-tissue, may form sinuses and discharging surfaces extending deeply in various directions, and sometimes causing perforations through the labia.

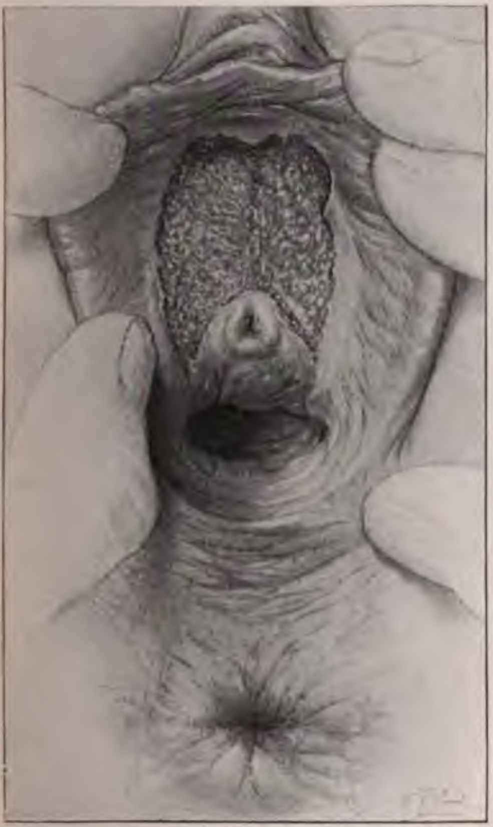


Fig. 271.—A tuberculous ulcer of the vulva. (Kelly—*Operative Gynecology*.)

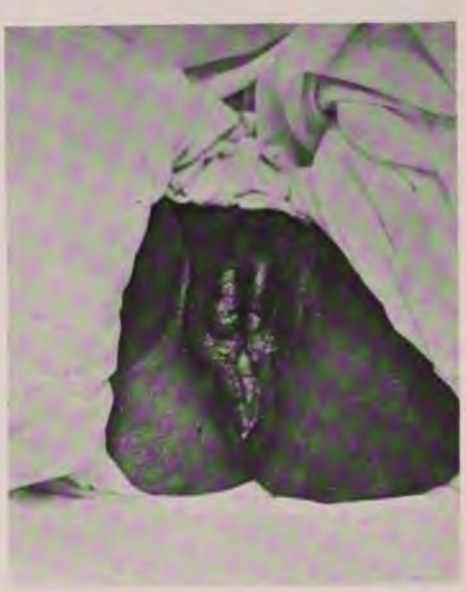


Fig. 272.—Tuberculosis of vulva. (McGlinn—*Am. Jour. Obst. and Gynec.*)

A positive diagnosis requires a microscopic examination. In a doubtful case the crucial test of the character of the ulceration consists in finding tubercle bacilli in the secretion or in demonstrating the characteristic pathologic changes in a specimen of tissue removed from the margin of the ulcer.

Treatment.—If there are no marked tuberculous lesions elsewhere, the chance of eliminating the local lesion by x-ray or radium treatment is very good. If the involved area is so situated that it can be completely and easily excised it is well to thus eradicate it. However, if the lesion is at all extensive excision involves considerable uncertainty as to complete removal and occasions considerable subsequent deformity. As a rule it is better to use x-ray, and if that is not successful, then radium.

TUBERCULOSIS OF VAGINA

Tuberculosis of the vagina (Figs. 273, 274) is usually secondary to tuberculosis of the uterus and tubes, the vaginal surface being infected from the tuberculous discharge from above. Some cases occur, however, in which there is no tuberculous trouble higher in the genital tract. In such a case the vaginal tuberculosis may be due to sexual intercourse with a husband having tuberculous lesion of the genital tract, or to the use of an infected douche-nozzle or to the extension inward from tuberculosis of the vulva.

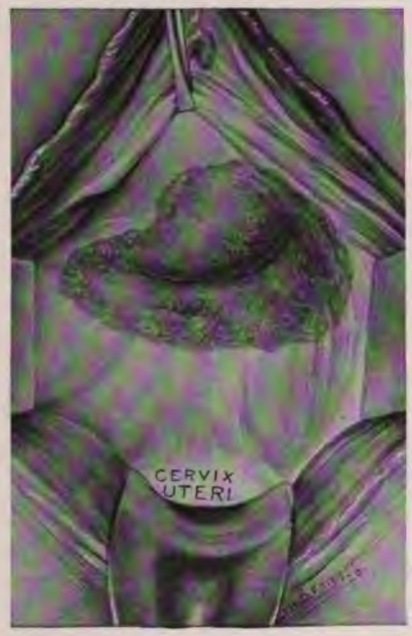


Fig. 273.—Tuberculosis of vagina. (Cullen—*Surg. Gynec. and Obst.*)

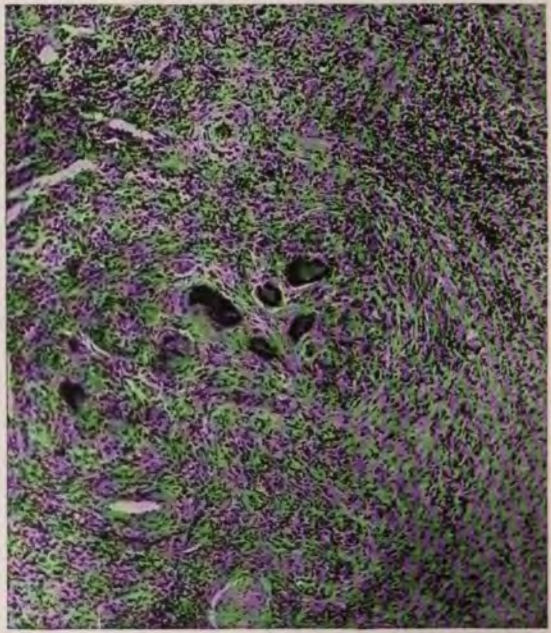


Fig. 274.—Tuberculosis of vagina. Microscopic section showing giant cells. (Cullen—*Surg. Gynec. and Obst.*)

The most common site for vaginal tuberculosis is the posterior vaginal fornix, which region comes most in contact with the uterine discharges. It is supposed that the resistance of the vaginal epithelium must be lowered by an irritating discharge or otherwise, before invasion by the tubercle bacillus can take place. The first manifestation of tuberculosis of the vaginal wall is the development of a number of miliary tubercles. These may be confined to a small area, for example, to the posterior fornix, or may appear over a large part of the surface at once.

Each miliary tubercle is a small, raised, grayish or yellowish dot, the size of a millet seed or smaller. As the lesions develop they break down and form small ulcers, which may coalesce and form ulcers of various sizes. The tuberculous ulcer has a punched-out appearance, the edges being perpendicular, and the base is yellowish gray and may show many miliary tubercles. The miliary tubercles frequently occur in large numbers in the hyperemic zone about the ulcer.

Symptoms and Diagnosis.—The stage of ulceration is usually the time at which the patient consults the physician, complaining of discharge and discomfort. Examination reveals the suspicious ulcer or ulcers and further investigation will usually show tuberculous disease of the uterus or tubes.

The discharge from a tuberculous ulcer contains tubercle bacilli, but sometimes in such small numbers that they are not found when the discharge is stained and examined. In a doubtful case, some tissue from the margin of the suspected ulcer may be submitted to microscopic examination. In such a specimen, in addition to the tubercle bacilli, there are found the characteristic giant cells and necrotic areas. Another way of testing for tuberculosis in the laboratory, is by injecting some of the secretion into the peritoneal cavity of a guinea pig, where it causes tuberculous peritonitis with characteristic lesions.

Treatment.—The treatment is the same as that described under tuberculosis of vulva.

GRANULOMA INGUINALE

This tropical form of ulceration about the genitals (Figs. 275 to 278) has been found to occur not infrequently in temperate zones. Following the early report of Symmes of two cases in Bellevue Hospital, New York, Randall, Small and Belk (Surgery, Gynec. and Obst., June, 1922) reported sixteen cases

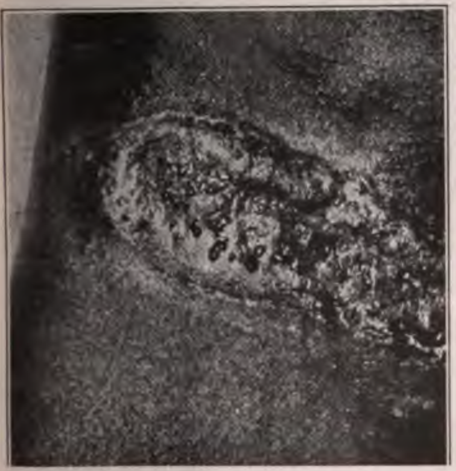


Fig. 275.—Granuloma inguinale, showing the inguinal ulceration. (Symmers and Frost—*Jour. Am. Med. Assn.*)

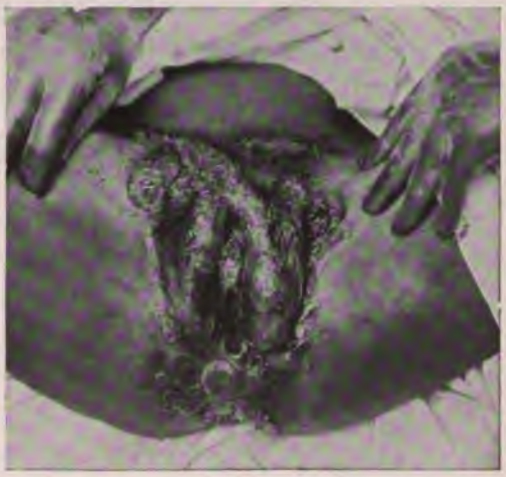


Fig. 276.—Granuloma inguinale, showing extensive vulvar ulceration. (Randall, Small and Belk—*Surg., Gynec. and Obst.*)

from the Philadelphia General Hospital. This latter is a very extensive and complete article, and the reader is referred to it for a most satisfactory consideration of the many features of the subject. The main points of the affection may be stated as follows, quoting from the article:

1. Granuloma inguinale, long considered a tropical disease, is endemic in the temperate zone of the United States.

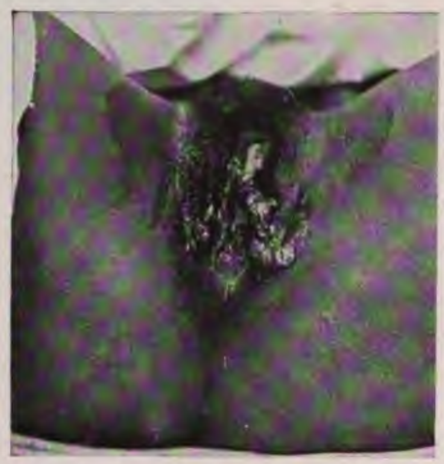


Fig. 277.—Granuloma inguinale, showing beginning vulvar ulceration. (Randall, Small and Belk—*Surg., Gynec. and Obst.*)

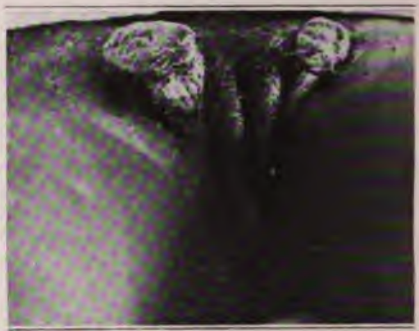


Fig. 278.—Granuloma inguinale, showing ulcerating inguinal gland. (Lynch—*Jour. Am. Med. Assn.*)

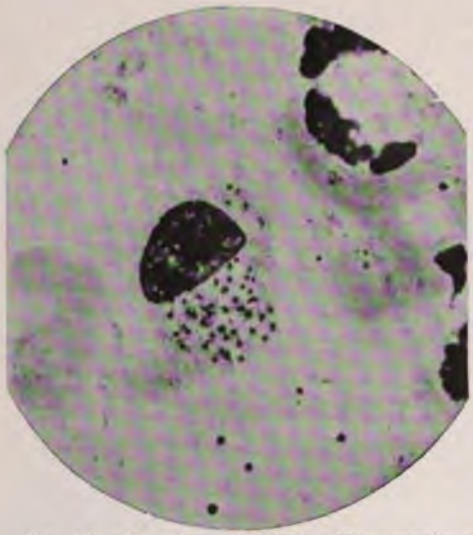


Fig. 279.—Granuloma inguinale. The organisms stained in cells. (Randall, Small and Belk—*Surg., Gynec. and Obst.*)

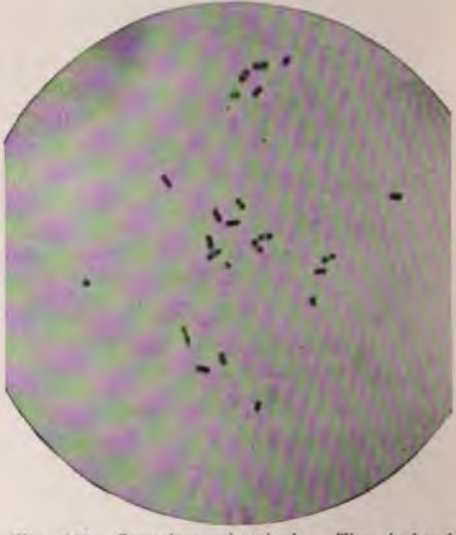


Fig. 280.—Granuloma inguinale. The isolated organisms stained. (Randall, Small and Belk—*Surg., Gynec. and Obst.*)

2. Its diagnosis is dependent on (a) the characteristic local lesion, (b) the marked predominance in the negro race, (c) and the finding of the specific organism originally described by Donovan (Figs. 279, 280).

3. Wassermann tests have been negative with a few exceptions, where undoubtedly a double infection has been present, and in these, energetic antiluetic treatment has been devoid of effect upon the granuloma.

4. Treatment with tartar emetic intravenously acts as a specific, and rapid healing may be expected (Figs. 281, 282) with the prompt disappearance of the specific organism.

"The usual history is that the lesion started as a small papule, noninflammatory, which after rupture and the exudation of a slightly purulent fluid, refused to heal, and exhibited progressive tendencies toward slow proliferation and spreading. The typical lesion (especially seen when involving the inguinal region, see Fig. 275) is a flesh-red, exuberant, overgrowth of soft granulation tissue.

"As indicated by the name, the most frequent location is in the groin, spreading upward as far as the anterior superior spine and downward through the fold of the groin, frequently involving the perineum, and in some cases following the fold of the nates and spreading to the buttocks. In certain patients the history apparently points to granuloma infection superimposed upon a prior existent genital lesion.

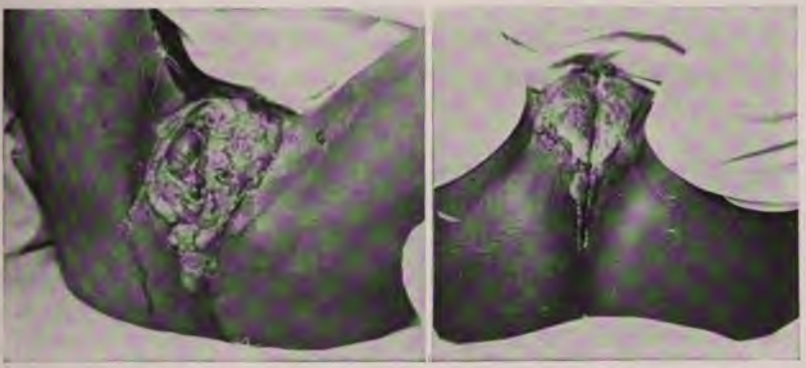


Fig. 281. Fig. 282.

Figs. 281 and 282.—Granuloma inguinale, showing effect of treatment. Fig. 281 shows extensive ulceration which had persisted more or less for three years in spite of antisyphilitic and other treatment, including x-ray Fig. 282 shows the ulceration entirely healed after two months of tartar emetic administration. (Randall, Small and Belk.—*Surg., Gynec. and Obst.*)

"We have based our diagnosis on the fairly characteristic clinical pictures, and also especially on the bacteriological findings of the specific organism. This latter is done by making smears from the exuding surface in which will be found numerous large mononuclear plasma cells, the protoplasm of which, on proper staining, will be found studded with the characteristic encapsulated bacillus originally described by Donovan.

"The smears are dried quickly in air and stained either by the Wright's or the Giemsa method. Wright's staining is the more rapid and has given satisfactory results. The proper differentiation of the stained smear in distilled water is the chief technical difficulty. Even with the most intense staining this differentiation should not be carried out for more than 15 to 20 seconds. Overdifferentiation completely decolorizes the capsules of the organisms; while underdifferentiation fails to bring out detail and contrast between the body proper and the capsule. The best staining results show the organisms as small, rounded, pink bodies with a dark blue coccoid body in the center; or, more frequently as oval pink bodies with a blue bacillary or diplococcoid body occupying the longitudinal axis. The pink outer zone is a wide capsule. The dark blue central bodies represent metachromatic granules within the body proper. The true outline of the body proper can be studied only after the capsule has been entirely decolorized (Fig. 280)."

The therapeutic result from the use of antimony intravenously may likewise be taken as indicative of the accuracy of the diagnosis, for, after three or four administrations, the organism disappears entirely from the surface and cannot be found in the smears, and healing promptly follows. Any pudential sore, resistant to the ordinary surgical antiseptics, unimproved by arsenical therapy, of long duration, and especially when devoid of pain, should be searched for the specific organism of granuloma inguinale and given the advantage of antimonial treatment.

Treatment

"Following Vianna's work, we started giving antimony intravenously in the form of tartar emetic. The initial dose of 0.04 gram was used, and this quickly advanced to a maximum dosage of 0.10 gram. Our first treatments were given daily and most patients tolerated this until about ten doses had been given, but nearly all after that amount showed some symptoms of intolerance for the drug. We then began intermitting the daily dosage, governing the time by symptomatic data. This intolerance consisted of rheumatoid pains in the joints associated with stiffness, especially seen in the early morning on rising, most frequently located through the shoulder girdle, and as a rule wearing off during the course of the day. There have not been in any case symptoms of alarming character.

"The drug has been prepared by dissolving 0.1 gram in 10 cubic centimeters of sterile normal saline solution and is best preserved in sealed sterile ampules. Intravenous administration is essential.

"The typical encapsulated organisms cannot be demonstrated in smears from the lesion after the second or third dose of the tartar emetic. Healing commences within 48 hours after the first administration, and from then on almost daily progress can be appreciated."

MALIGNANT DISEASE OF THE VULVA

Carcinoma and sarcoma may affect the external genitals (Figs. 283 to 293). In this situation they are distinguished by the same signs that characterize them elsewhere, namely, progressive induration, ulceration and involvement of the neighboring lymph glands. Malignant disease of the external genitals is rather rare.

Epithelioma is the most frequent form. This begins usually on the lower portion of the labium majus as a small hard nodule with a bluish tinge especially about the edge. The nodule grows slowly and at first may produce

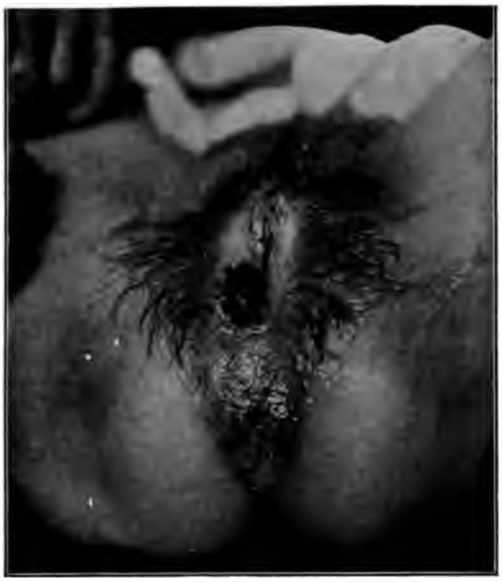


Fig. 283.—An epithelioma of the right labium. (Hirst—*Diseases of Women.*)

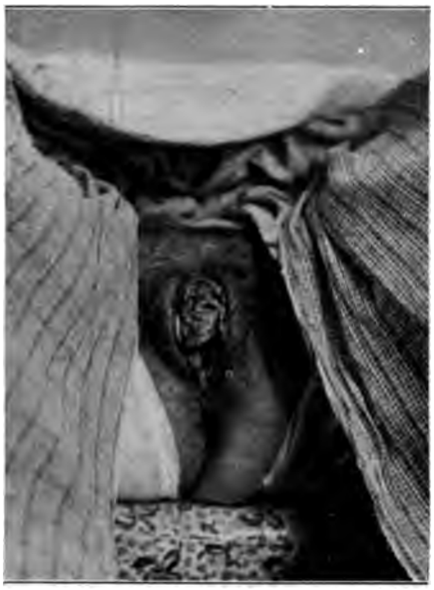


Fig. 284.—Carcinoma of labium minus, beginning. (Hirst—*Diseases of Women.*)

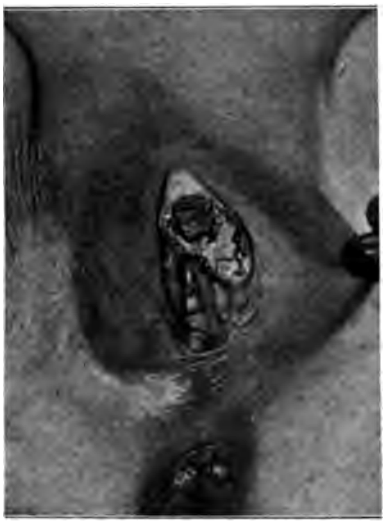


Fig. 285.—An epithelioma of the clitoris. (Hirst—*Diseases of Women.*)

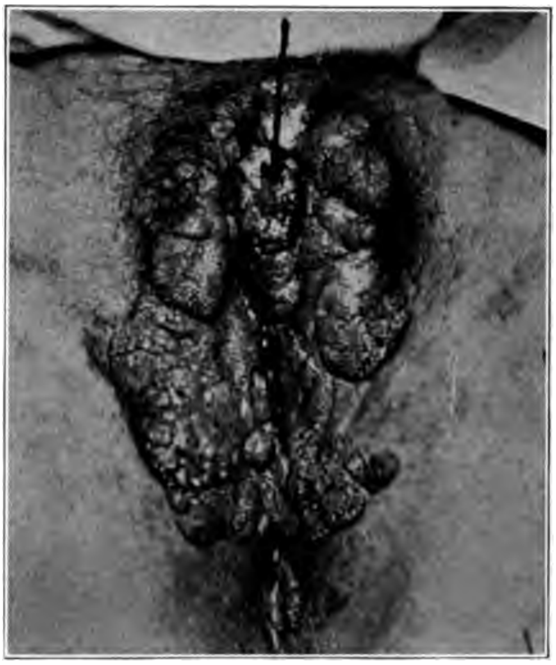


Fig. 286.—Carcinoma of clitoris, starting from condyloma. (Taussig—*Trans. Am. Gynec. Soc.*)

no symptoms. In some cases, however, even from the first there is severe pruritus. After a time, part of the nodule breaks down, forming a small ulcer which is surrounded by an area of induration (Figs. 283, 284, 289). There is a watery discharge sometimes mixed with blood. It may begin in the labium minus (Fig. 283) or in the clitoris (Fig. 285). After the malignant induration breaks down and ulcerates, the progress is rapid. The adjacent surfaces become involved in the destructive process, and in the later stages a large fungating mass may form.

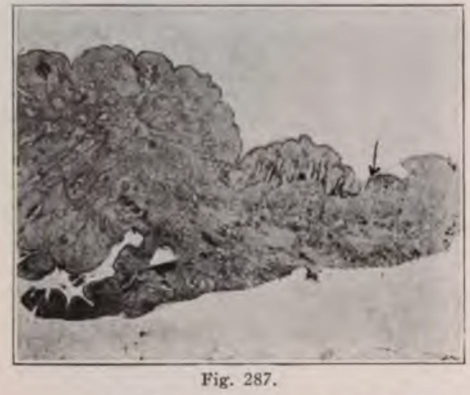


Fig. 287.

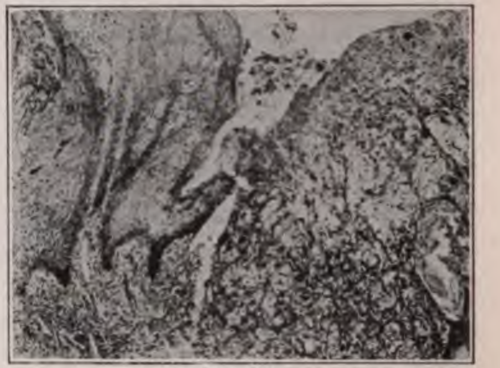


Fig. 288.

Figs. 287 and 288.—Carcinoma of clitoris starting from condyloma. Fig. 287 is a microscopic section, low power, showing condyloma and carcinomatous area. Fig. 288 is high power showing the edge of the invading carcinoma. (Taussig—*Trans. Am. Gynec. Soc.*)

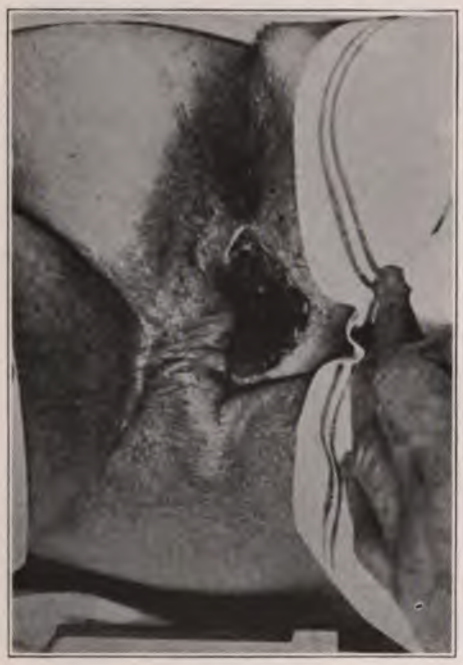


Fig. 289.

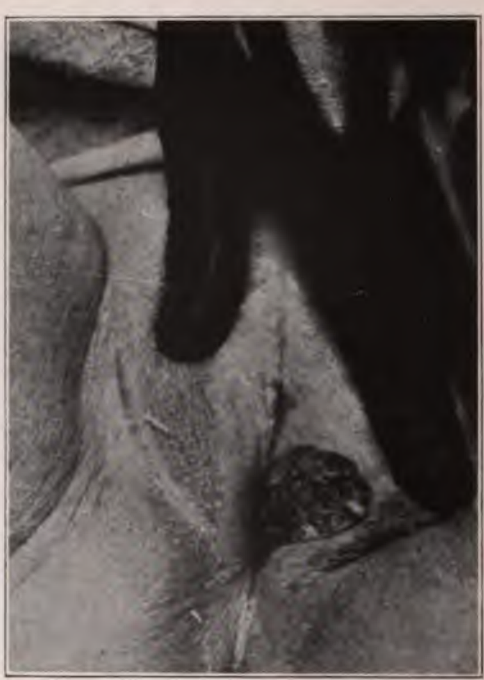


Fig. 290.

Figs. 289 and 290.—Two patients with carcinoma of the vulva starting on a kraurotic base. (Taussig—*Trans. Am. Gynec. Soc.*)

The relation of chronic vulvar irritation, particularly kraurosis vulvae, to the origin of cancer has been emphasized by Taussig (Trans. Am. Gynec. Soc., 1917), and is well brought out by the cases shown in Figs. 286 to 292.

The inguinal glands become enlarged early, at first simply from the lymphatic enlargment that always takes place when there is inflammation or persistent irritation of the genital region. Later the glands become infiltrated with cancer cells and often greatly enlarged. In the latter stage the carcinomatous glands break down and ulcerate externally.

Experience has shown that, unless recognized and treated very early, the disease is usually incurable. Its duration from the beginning is usually about two years.

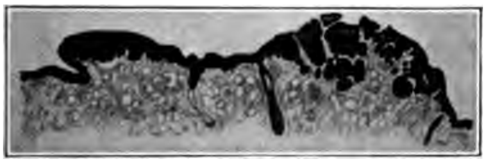


Fig. 291.

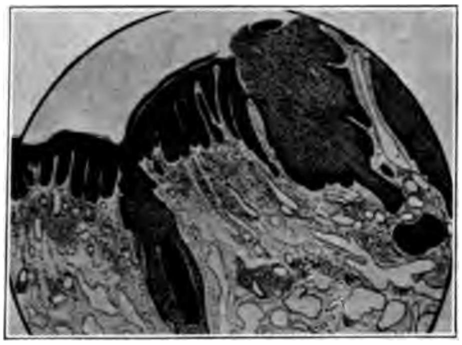


Fig. 292.

Figs. 291 and 292.—Carcinoma of vulva starting on a kraurotic base. Fig. 291 is a microscopic section, low power, showing the kraurosis and the carcinoma. Fig. 292 is high power of the margin of the invading carcinoma. (Eden—*Trans. Am. Gynec. Soc.*)

The patient may suffer from burning and superficial pain in the early stages and later there may be severe pain from involvement of the deeper structures. Carcinoma of the clitoris (Figs. 285, 286) has been observed a number of times. Frequently it is melanotic. A rarer location for cancer is the vulvovaginal gland, the particular form of growth originating here being the adenocarcinoma (Figs. 315, 316, 317). The urinary meatus is another site where cancer occasionally develops, and in any persistent bleeding infiltration there, this condition should be considered. In all of these forms of growth, treatment in a very early stage gives the only probability of cure. Consequently, in the case of a suspicious ulcer or nodule in which the diagnosis remains doubtful after careful treatment for a short time, a piece of the margin of the area should be excised for microscopic examination.

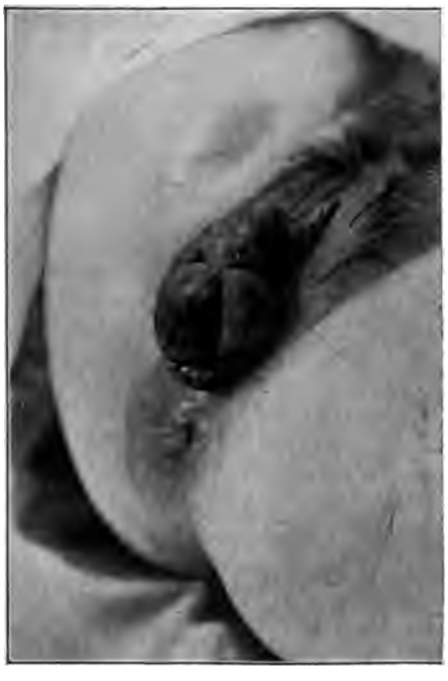


Fig. 293.—Sarcoma of labium. (Hirst—*Diseases of Women.*)

Treatment.—Early and wide excision is the treatment to employ when the disease is operable. If desired this may be preceded by a radium application and followed by deep x-ray therapy. In the inoperable cases and in the borderline cases radium and x-ray are our most effective remedies for palliation and in some cases a cure may be effected. In advanced cases there is so much destruction of tissue by ulceration that it is difficult to keep the ulcerating surface clean and free from odor. Iodoform and charcoal, half and half, sprinkled freely over the surface and covered with gauze, aids in this. The salicylic acid and iodoform powder has much the same effect.

In the inoperable cases, opium will be required sooner or later to diminish suffering, and, when needed, it should be given freely and gradually increased as required to give relief. In the inoperable cases, particularly the cases of sarcoma (Fig. 293), the mixed toxins of the streptococcus and the Bacillus prodigiosus (Coley's toxins) may be found beneficial. If these fail, the growth may be somewhat retarded by repeated injections of a few drops of alcohol in various parts of the growth. These injections may be repeated every two or three days or at longer intervals, according to the disturbance they cause.

MALIGNANT DISEASE OF THE VAGINA

Carcinoma of the vagina is usually secondary (Fig. 294) to carcinoma of the uterus or rectum or bladder or external genitals, and the treatment depends on the situation and extent of the principal lesion. Primary carcinoma of the vagina (Fig. 295) is rare. It is of the squamous-cell variety (epithelioma) and, according to Pozzi, it occurs in two forms.

1. As a papillary growth. This form usually attacks the posterior wall of the vagina, making its appearance as a broad-based excrescence, which first invades the fornix and then extends downward toward the vulva. It appears, in some cases, to have its origin in the neighborhood of plaques of chronic vaginitis.

2. Nodular or infiltrated form. This appears as nodules which rapidly become confluent. The growth is sometimes localized about the wall of the urethra, giving rise to a well-defined clinical type known as "periurethral cancer." Ulceration here advances rapidly.

In primary cancer of the vagina, as in cancer elsewhere, a positive diagnosis in the early stages must rest upon microscopic findings in an excised piece. The treatment is complete extirpation, if seen early enough. The results thus far have been unsatisfactory. There is usually recurrence. If at all advanced, radium followed by x-ray is the preferable form of treatment.

CHORIOEPITHELIOMA.—This variety of carcinoma sometimes occurs in the vagina, representing an early metastasis. This curious form of tumor will be considered in greater detail under Malignant Disease of the Uterus. It arises from chorionic villi and may develop after normal parturition or after abortion or after mole-pregnancy. It usually develops in the uterus, but occasionally one of the chorionic villi transported to the vagina (pieces of chorionic villi are normally transported to various parts of the body in probably all pregnancies) takes on the peculiar change and forms a malignant growth. As it grows, it breaks into the veins, causing miniature hematomata in the vicinity. As this kind of tumor usually causes metastases through the body, with rapid death, it is important to recognize and remove it at the earliest possible moment. Since such a growth in the vagina or in the vulva is usually metastatic from a similar growth in the uterus, the condition of the uterus should be investigated.

Sarcoma.—One form in which sarcoma of the vagina occurs, is as a diffuse infiltration and degeneration of the lining membrane. This is the form sometimes found in young children. It occurs most frequently in the posterior vaginal wall. It begins as a small indurated area which slowly increases in size. After a time the epithelium covering the area is lost and an ulcer forms. The ulcer bleeds easily and is surrounded by an area of induration. A large part of, or even the entire circumference of, the vagina may become involved in the sarcomatous infiltration, which may be mistaken for carcinoma or tuberculosis. In another type in young children grape-like masses form in the vagina and may project outside, as in the case from which the illustrations were taken (Figs. 296, 297, 298). There is some difference among pathologists as to the classification of this type of tumor, the term malignant rhabdomyoma apparently being most popular at present.

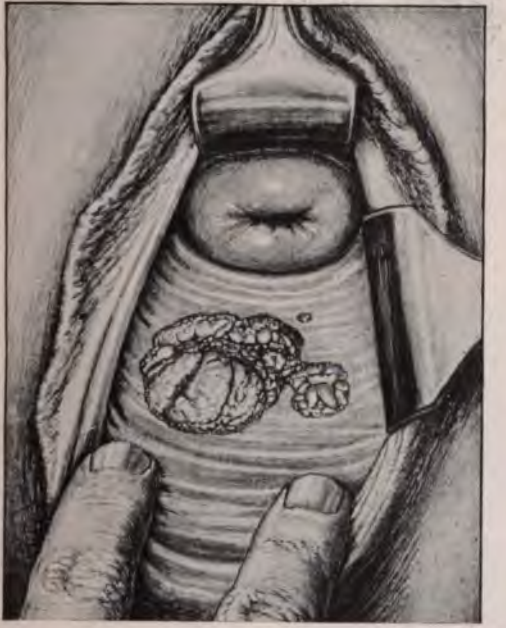


Fig. 294.—Secondary Malignant Ulceration of the Vagina. In this case there was a carcinoma of the endometrium, and the discharge caused an implantation carcinoma where the cervix came in constant contact with the posterior vaginal wall. (Kelly—*Operative Gynecology.*)

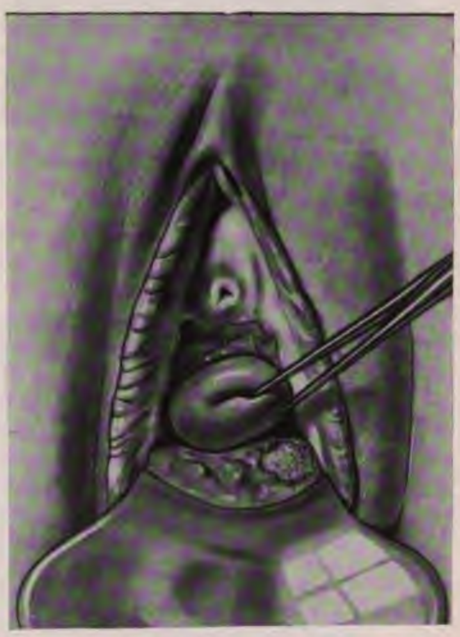


Fig. 295.—Primary Malignant Ulceration of the Vagina. (Montgomery—*Practical Gynecology.*)

The symptoms of sarcoma of the vagina are leucorrhea, hemorrhage, pain and obstruction of the vagina by the infiltration. Slight hemorrhage may

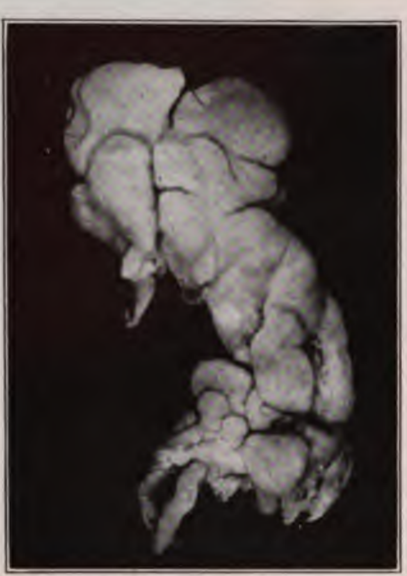


Fig. 296.—Sarcoma of vagina in child, age 5 years. This specimen protruded from the vagina as a reddened cauliflower mass. Microscopic diagnosis, myosarcoma. Gyn. Lab.

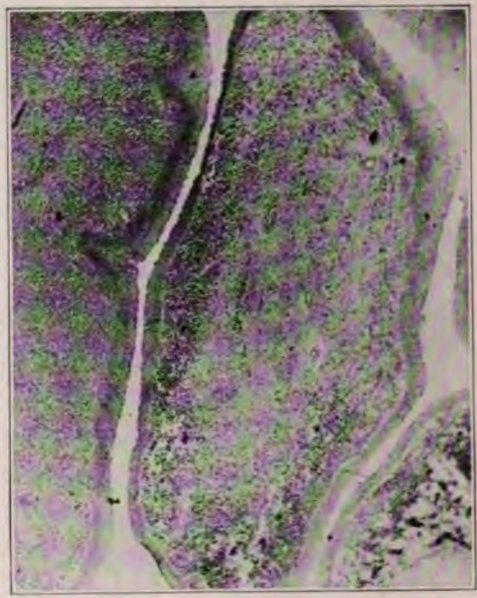


Fig. 297.—Microscopic section of specimen shown in Fig. 296. Low power. Gyn. Lab.

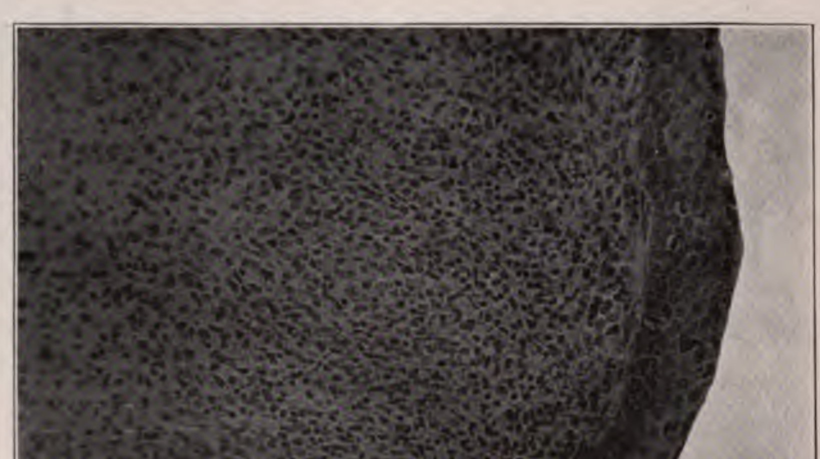


Fig. 298.—Microscopic section of specimen shown in Fig. 297. High power, showing the margin of one of the grape-like masses. Gyn. Lab.

appear in the early stages, particularly after coitus or exertion. In the late stages, profuse hemorrhages occur and there is also a muco-purulent or watery discharge that may cause pruritus. The pain is slight at first but grad-

ually increases in severity. It is usually worse at night. Examination reveals a nodular tumor or an area of induration or ulceration and more or less narrowing or obstruction of the vagina. For a positive diagnosis of the nature of the growth a microscopic examination of a section of tissue is necessary. The treatment is the same as for carcinoma.

ULCUS RODENS VULVAE

From the large group of affections formerly classified roughly under the terms "rodent ulcer," "lupus," "esthiomene," "perforating ulcer" and similar names, there have been cut out distinct classes, until now these cases are pretty well divided up as syphilis, tuberculosis (to which the term lupus is now restricted) and malignant disease, with special characteristics for each. There still remain, however, certain persistent destructive ulcers, but rarely seen, whose etiology is not definitely known, and consequently whose etiologic classification cannot yet be positively made.

They constitute a class by themselves and, in the absence of more definite information, are very appropriately designated by the non-committal term "ulcus rodens"* (gnawing ulcer).

Rodent ulcer of the vulva may be defined as a destructive chronic ulcer that is neither syphilitic nor tuberculous nor malignant. Granuloma inguinale also must be excluded.

The affection occurs almost exclusively in prostitutes and is apparently due to the combination of depressed general health and the chronic irritation of frequent coitus (traumatism) and varied and repeated infections and uncleanliness. The postsyphilitic state is undoubtedly an important etiologic factor in many cases, the effect being due probably to the deteriorated general health and lowered tissue resistance. Real syphilitic lesions, i.e., those yielding to antisyphilitic treatment, are excluded by the terms of the definition of rodent ulcer, the clinical differentiation being aided by the therapeutic test. The cicatricial tissue which forms around and under the ulcerated area tends further to interfere locally with nutrition.

The pathologic changes are those found in chronic ulceration with cicatricial change, but without any of the special characteristics found in syphilitic, tuberculous or malignant ulcers. There is the granulating surface, the round-cell infiltration and the connective tissue hyperplasia. The ulceration often extends deeply into the structures in various directions and causes perforations and fistulae. As it spreads in one part it heals in another, thus forming scar-tissue. The contraction of this scar-tissue and of the inflammatory infiltration under the ulcer causes more or less interference with the lymph circulation. If the trouble persists for years, as it sometimes does, there is very likely to be stasis hypertrophy.

Treatment.—The measures recommended under simple ulcers should be carried out and should be supplemented by general tonic treatment to build up the tissue resistance. In addition to this, practically every case of this kind should receive a thorough course of iodides, both for diagnostic purposes and for therapeutic effect. Very few cases of rodent ulcer are much benefited by the iodides but occasionally one is considerably benefited. Other measures are mild cauterizations, deeper cauterization and other measures mentioned under chancroid. The x-ray treatment sometimes produces prompt healing. A very important point in the treatment is rest of the parts. To secure this there must be no sexual intercourse and no unnecessary walking or standing.

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*This must not be confounded with the "ulcus rodens" of the face, which is a definite and peculiar variety of epithelial cancer.

URETHRITIS

Inflammation of the urethra and also of the urethral ducts (Skene's glands) has already been considered, under Gonorrhea.

PERIURETHRAL ABSCESS

This term is applied to an abscess situated outside of the urethra but due to infection from the urethra (Figs. 299, 300). It usually lies between the urethra and vagina. The pocket of pus may or may not communicate with the urethra. This condition is known also as "urethrocele," "sacculation of urethra," "sinus of urethra," "urethral diverticulum" and "suburethral abscess."

Etiology and Pathology.—In some cases there is infection of a urethral gland which becomes somewhat obstructed and dilated with pus and is accompanied with considerable inflammation and infiltration and pus formation outside the gland. In other cases there is probably first either a congenital cyst or a cyst formed by obstruction of the duct of one of the urethral glands which becomes markedly dilated by accumulating secretion. Later there is infection of the cyst by rupture or otherwise, and consequent abscess. It is supposed also that injuries in labor may lead to localized dilation, sacculation and suppuration.

In either case, as the collection of fluid increases in size a swelling appears in the anterior vaginal wall below the urethra (Fig. 300). In some cases the vaginal wall over the swelling is normal, while in other cases there is much infiltration and thickening and induration. The abscess frequently ruptures into the urethra and empties itself incompletely. It may continue for weeks or months partially filled with pus and decomposing urine, and discharging through a small opening. In other cases there seems little or no active inflammation and no discharging sinus, simply a collection of fluid resembling a cyst. In such a case there may be simply a retention cyst without infection or there may have been an infection that died out without forming pus.

Symptoms and Diagnosis.—When there is an acute abscess, there are all the ordinary evidences of inflammation with urethral irritation added, causing frequent painful urination. In some cases there still remain evidences of the urethritis that was responsible for the periurethral infection. There is a reddened tender indurated swelling of the anterior vaginal wall under the urethra. The swelling and induration may be diffuse or circumscribed. If a collection of pus of any size has formed there will be fluctuation. If the abscess has opened into the urethra, pressure on the swelling will cause pus to flow into the urethra and out at the meatus. Sometimes a probe may be passed from the meatus through the opening into the periurethral cavity (Fig. 299).

When the acute inflammation has subsided, there is left simply a swelling with considerable urethral irritation. If the cavity is discharging into the urethra, the swelling may have largely disappeared. Such a pocket outside the urethra may cause urethral and bladder disturbance for months without the real condition being suspected, particularly if there is simply a sinus or small pocket with but little swelling. It may keep up a urethritis indefinitely and, if gonorrheal, the patient is capable of communicating the infection as long as the sinus exists. An exacerbation of the inflammation with acute symptoms may come on at any time. Such a periurethral sinus may be the unsuspected cause of the persistent presence of pus in the urine.

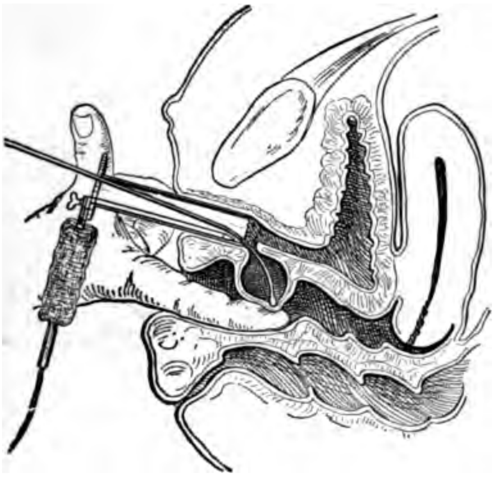


Fig. 299.—Testing for suburethral abscess. (Ashton—*Practice of Gynecology.*)

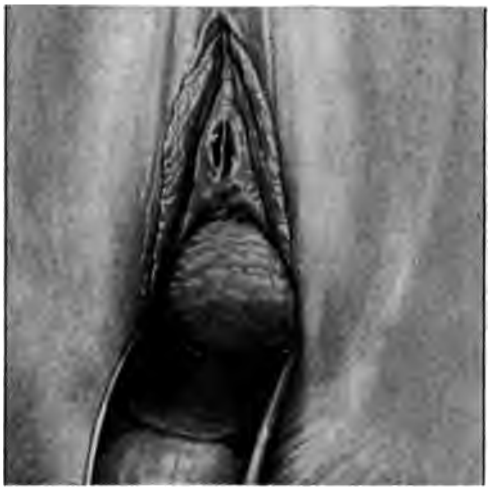


Fig. 300.—Suburethral abscess. View from in front. (Kelly—*Operative Gynecology.*)

Treatment.—The treatment for this condition is to drain the cavity at the most dependent part, that is, where it comes closest to the vaginal wall. At this point a large opening should be made and the incision should be kept open by gauze packing or a drainage tube until the cavity heals from the bottom. The abscess cavity should be washed out with hydrogen peroxide and given the usual treatment of a suppurating cavity. When drainage is free below, the opening into the urethra usually closes promptly.

When there is only a collection of fluid without active inflammatory symptoms, the small cysts thus formed may be extirpated. In extirpation of such a mass, care should be exercised not to dissect too close to the urethra or to the sphincter at the neck of the bladder. In either situation it is better to leave part of the cyst wall than to injure the important structures adjacent thereto. When there is simply a sinus or small pocket communicating with the urethra by a fairly large opening near the meatus, the plan may be tried of treating the cavity with various antiseptics such as hydrogen peroxide, iodoform in glycerin (10 per cent) or silver nitrate solution (½ per cent to 2 per cent), injected into the cavity by way of the meatus through a small tube such as the Eustachian catheter. If this fails, then the external incision and drainage are to be employed.

PROLAPSE OF URETHRAL MUCOSA

Prolapse of urethral mucosa is known also as "procidentia urethrae." It consists of a prolapse of urethral mucous membrane, accompanied by more or less proliferation of the submucous connective tissue.

Symptoms and Diagnosis.—The red projecting membrane surrounds the meatus (Fig. 302). It often bleeds easily and is somewhat sensitive to the touch, though not nearly so sensitive as a caruncle. It usually gives rise to considerable irritation, with frequent painful urination and some discharge. It is distinguished from polypus and caruncle by the fact that it surrounds, or almost surrounds, the meatus.

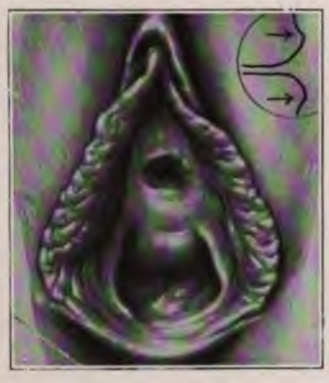


Fig. 301.

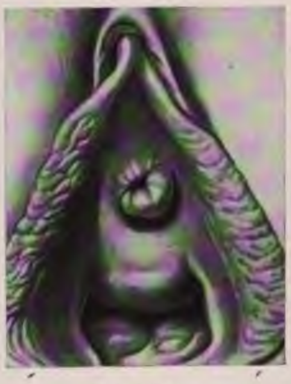


Fig. 302.

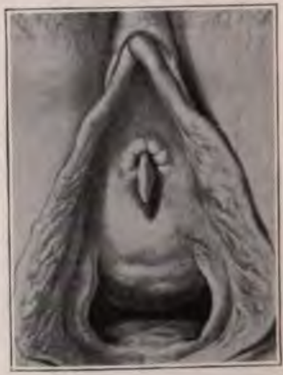


Fig. 303.

Fig. 301.—Relaxation of urinary meatus, with slight eversion of mucosa. A rather common condition in multipara.
Fig. 302.—Prolapse of the urethral mucosa. (Montgomery—*Practical Gynecology.*)
Fig. 303.—Urethral Caruncle. (Montgomery—*Practical Gynecology.*)

Marked prolapse of the urethral mucosa is not a common affection, though slight gaping of the urethra, through which the mucous membrane may be seen (eversion of urethral mucosa, Fig. 301), is very common in women who have had urethritis or have passed through several labors.

Treatment.—If symptoms are absent or slight, no treatment is necessary. If the prolapse is marked enough to be troublesome, the part may be cocainized, or the patient anesthetized, and the redundant portion of mucous membrane excised and the wound closed by sutures. It is convenient to pass the sutures first, then excise the tissue, then tie the sutures. This prevents the inner edge from retracting out of reach. The sutures should be placed close enough together to close the wound and prevent hemorrhage.

Another good method of excision is to begin at one side and divide the tissues for a short distance and immediately close the resulting wound by suture, continuous or interrupted as preferred. Another portion is then divided and the wound closed as before. This process is continued until the redundant tissue is removed all the way around. This prevents hemorrhage, prevents retraction and secures good approximation. Clean excision with the knife or scissors followed by immediate suture of the wound is decidedly preferable to cautery amputation.

URETHRAL CARUNCLE

Urethral caruncle is a small papillary growth occurring about the meatus, most frequently near the lower portion. It is usually very sensitive and often gives rise to excruciating pain on urination. It is known also as "irritable caruncle" and "urethral angioma." The cause of urethral caruncle is not known. Probably chronic inflammation of Skene's glands has some influence in its causation, as it usually occurs in the neighborhood of the gland openings. Inflammation of the urethra, particularly gonorrheal inflammation, is supposed to be a causative factor.

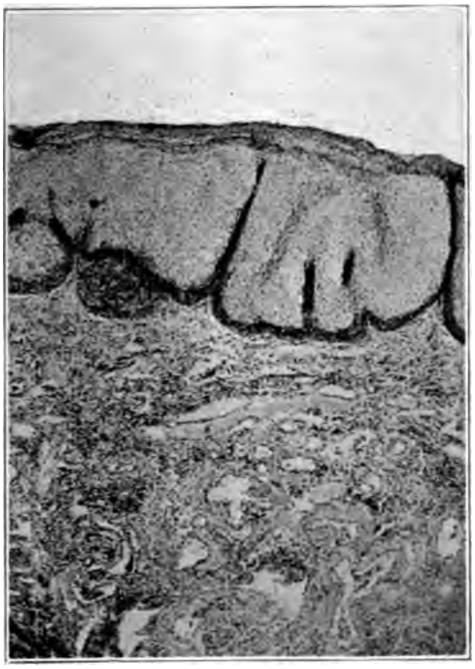


Fig. 304.—Urethral caruncle, showing thickened epithelium, dilated vessels and inflammatory areas. Gyn. Lab.

The little tumor is essentially a vascular growth. Skene, who made a special study of urethral neoplasms, applied to caruncle the term "papillary polypoid angioma" and gave the following description. "It consists of a bunch of dilated capillaries, set in a moderately dense stroma of connective tissue, covered with mucous membrane which has the usual pavement epithelium. One case, however, is recorded where the pavement was replaced by columnar epithelium. The vessels are greatly dilated and in some cases very tortuous, while in others less so."

The growth is seen as a deep red mass at the meatus (Figs. 303 and 304) or just within the canal. It is sensitive when touched and may bleed easily on manipulation. It may have a distinct pedicle or a broad base. Usually there is but one growth, but sometimes there are two or more.

Symptoms and Diagnosis.—The principal symptom is pain on urination. It may be slight or it may be very severe. In some cases the pain is so troublesome that the patient will hold the urine as long as possible, to avoid the suffering caused by passing it. Walking may cause pain as may also pressure of any kind, even contact of the clothing. Irritability of the bladder, as indicated by frequent urination, is usually present. Occasionally retention of urine is caused by reflex spasm. Pain and hemorrhage may be caused by sexual intercourse, and in some cases coitus is impossible. The patient's general health necessarily suffers from the constant irritation and she becomes nervous, irritable and despondent.

Polypi of the urethral mucous membrane and prolapsed mucous membrane differ from caruncle in being less vascular and less sensitive. Also, polypi are attached higher, while in prolapse of the mucous membrane the base of the mass includes the larger part, if not all of the circumference of the meatus (Fig. 302).

Treatment.—The treatment for caruncle is removal. First apply a small piece of absorbent cotton soaked in cocaine solution (20 per cent) and leave in place five minutes. Then with a hypodermic syringe inject several drops of a weaker cocaine solution (½ per cent) under the base of the growth and wait a few minutes longer. Then clip the growth off with scissors. All the abnormal tissue must be removed. Then introduce one or more fine catgut sutures to close the wound and stop the hemorrhage.

If the base is small and the resulting wound slight and without much hemorrhage, it may be simply touched with carbolic acid or liquor ferri subsulphatis, no sutures being needed. When the growth has a broad base and the patient is very nervous or hysterical it may be necessary to give a general anesthetic. In some cases, anesthesia is required for other reasons, for example, a thorough pelvic examination or curettage or repair of pelvic floor, and in such a case the caruncle may be taken care of at the same time. The urethral and bladder irritation usually subsides rapidly after the growth is removed.

While the patient is waiting for operation, some temporary relief may be given by the frequent application of cocaine solution (5 per cent to 10 per cent).

INFLAMMATION OF VULVOVAGINAL GLAND

Inflammation of the duct of the vulvovaginal gland and of the gland proper, has been considered under Gonorrhea. Inflammation in this gland of Bartholin is sometimes referred to as "Bartholinitis."

ABSCESS OF VULVOVAGINAL GLAND

The cause is infection with the gonococcus or the ordinary pus germs. The first is by far the more frequent, and the gonorrheal inflammation often persists in the gland long after the vaginal inflammation has disappeared.

The infection enters at the mouth of the duct and progresses along the duct to the gland proper. The secretion of the gland is increased, the duct becomes obstructed and a collection of pus forms, distending the gland and pointing in the direction of least resistance. Sometimes the duct alone is involved, the gland proper escaping. This is indicated by the swelling being small and confined to the region of the duct.

Symptoms and Diagnosis.—The symptoms are a painful swelling at the side of the vaginal opening with some fever. Examination reveals a swelling the size of a small egg situated in the tissues at one side of the vaginal orifice and projecting beyond the median line (Figs. 305, 306, 307). The swelling is tender on pressure and is red and hot. Fluctuation is distinct and the fluid seems near the surface. The orifice of the duct may be seen, but a probe will

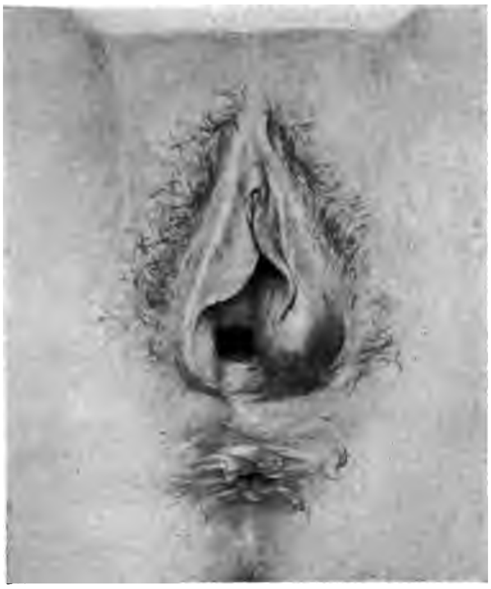


Fig. 305.—Abscess of vulvovaginal gland, left side. (Kelly—*Operative Gynecology*.)

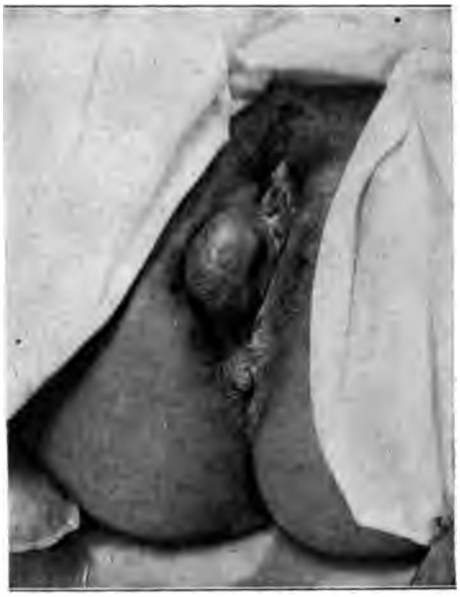


Fig. 306.—Another case of abscess of vulvovaginal gland, right side. (Hirst—*Diseases of Women*.)

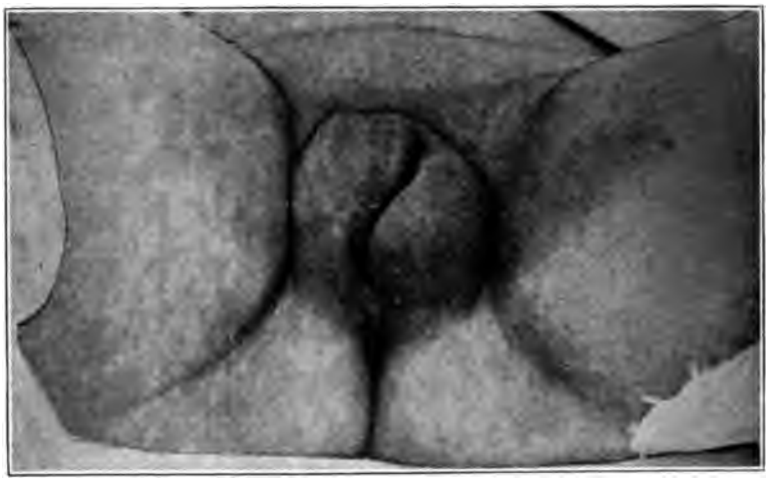


Fig. 307.—Case of abscess of vulvovaginal gland on each side. (Weiner—*Am. Jour. Obst.*)

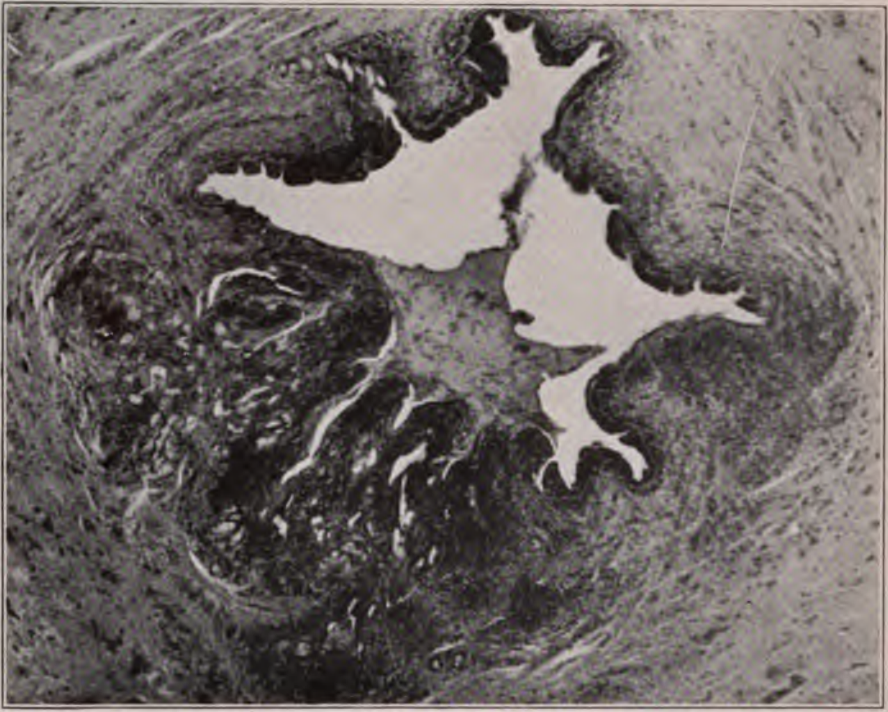


Fig. 308.—Cross section of vulvovaginal gland, removed for chronic inflammation. Wall thickened by increase of fibrous tissue. Cavity contains pus. Notice the marked inflammatory infiltration about the gland acini in the left central portion of the photograph. Microscopic, low power. Gyn. Lab.

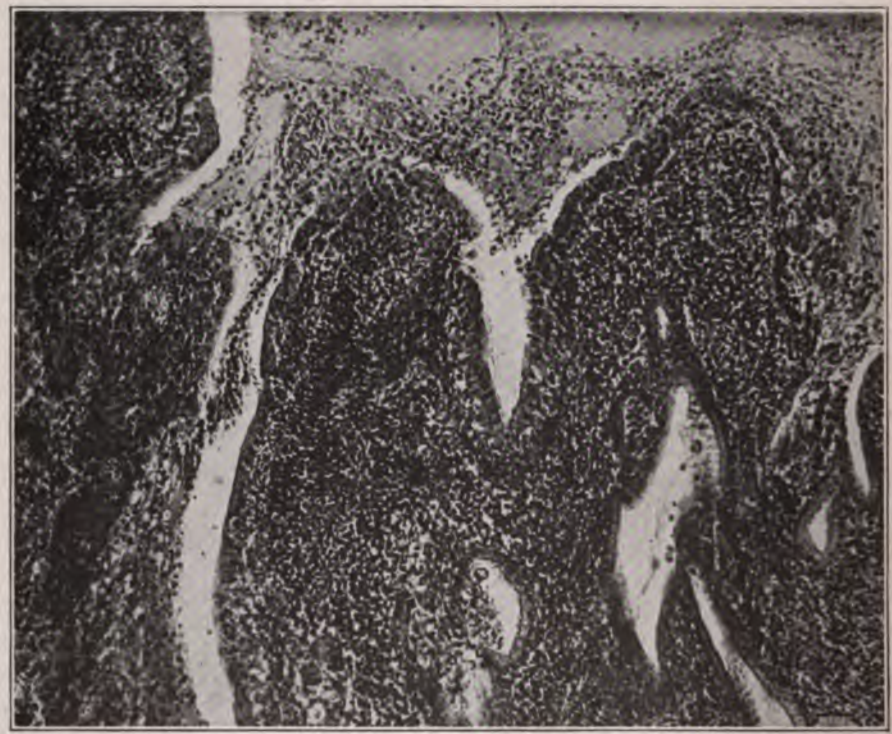


Fig. 309.—High power of Fig. 308. Chronic inflammation of vulvovaginal gland. Notice pus in lumen and dense inflammatory infiltration below. Gyn. Lab.

not enter the gland because the duct is obstructed. If the obstruction is so slight that it gives way before the probe, then pus is discharged through the duct. The microscopic changes in the tissues are shown in Figs. 308 and 309.

The following conditions may be confounded with abscess of the vulvovaginal gland.

Cyst of Vulvovaginal Gland is a chronic affair, the patient usually giving a history of the swelling having been there for a long time and the inflammatory signs (heat and pain and redness) are absent.

Pudendal Hernia must always be taken into consideration in determining the character of a swelling of the vulva. Hernia presents one or more of the hernial signs, such as impulse on coughing, reducibility, intestinal obstruction, resonance on percussion. The first evidence of hernia is usually noticed at once after some straining effort or injury, much more promptly than either abscess or cyst would appear.

Tumor of Labia differs from abscess in the absence of inflammation, in growing slowly and in presenting the signs that distinguish the various kinds of vulvar tumors.

Treatment.—Open the abscess freely by an incision where the pus is nearest the surface, wash out the cavity with hydrogen peroxide and pack with antiseptic gauze. The wound should be dressed the next day and as frequently thereafter as is necessary to keep it clean. Care must be taken that a good-sized piece of gauze projects into the cavity, that the edges of the incision may be kept separated until the cavity granulates from the bottom.

SINUS OF VULVOVAGINAL GLAND

In many cases of abscess of the gland, after the pus is discharged the cavity closes entirely and there is permanent cure. In other cases a sinus persists, giving rise to a constant slight discharge. The outer end of the sinus may close and a reaccumulation of pus take place, forming another abscess. This may be repeated several times in the course of a few years. Again, in inflammation of the vulvovaginal gland, the duct may remain open giving exit to the pus as it forms and constituting a sinus or discharging tract.

The diagnosis of sinus of the vulvovaginal gland is made by the history of inflammation of the gland associated with a sinus in that locality. By palpating the gland (Fig. 61), it can often be felt as a small hard lump, indicating infiltration and enlargement. Pressure on this lump will sometimes cause pus to flow from the sinus. A small probe introduced into the sinus passes into the region of the gland.

Treatment.—If the sinus has a good-sized external opening and has been present only a few weeks, it may close if washed out daily with hydrogen peroxide. The peroxide should be forced to the bottom of the sinus and it may be followed by iodoform in glycerin (10 per cent), or argyrol (25 per cent) or protargol (5 per cent to 10 per cent) or silver nitrate solution (2 per cent to 5 per cent). In most cases, however, the only way to effect a permanent cure is to extirpate the sinus tract and the infiltrated gland.

This is a comparatively small operation, but the patient will usually require a general anesthetic for considerable dissection is necessary. The parts are very vascular and there is much oozing. The resulting cavity is closed with sutures. The sutures serve also to stop the bleeding and ligatures are seldom necessary. Quite a depression is left where the inflamed gland was situated. This depression is not of particular importance and in time becomes less pronounced.

CYST OF VULVOVAGINAL GLAND

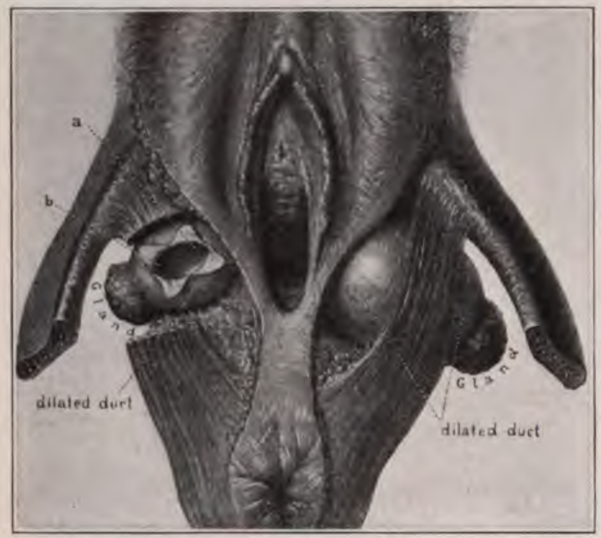


Fig. 310.—Deep relations of vulvovaginal glands when ducts become cystic. (Cullen, after Hugier—*Jour. Am. Med. Assn.*)

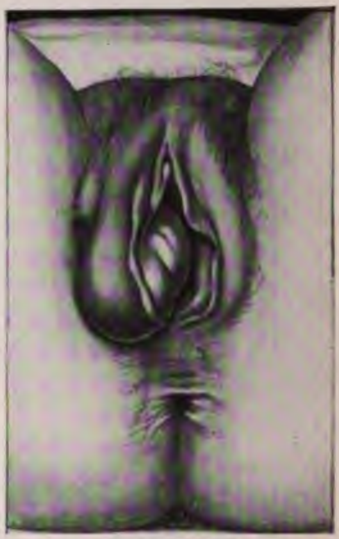


Fig. 311.—Cyst of right vulvovaginal gland and duct. (Montgomery—*Practical Gynecology.*)

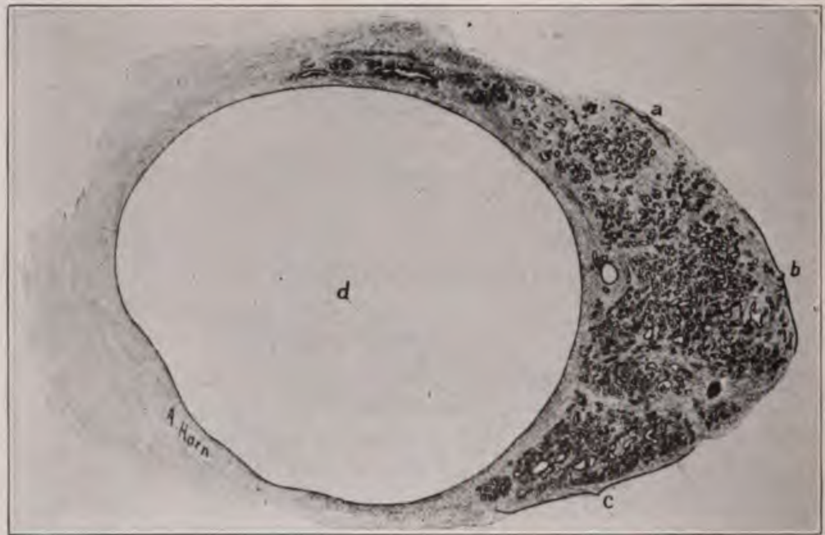


Fig. 312.—Cyst of duct of vulvovaginal gland. Notice how the gland substance has been pushed aside by the cystic duct. (Cullen—*Jour. Am. Med. Assn.*)

A cyst of the vulvovaginal gland is due to an obstruction of the duct, with accumulation of secretion from the gland, causing it and the duct to become dilated. In some cases of inflammation, gonorrheal or otherwise, cyst of the gland, instead of abscess, results. The cyst appears as a fluctuating swelling in the region of the gland (Figs. 310 to 312).

The swelling is not painful and the skin may be moved freely over it. The form and location of the swelling is like that of abscess, but none of the acute inflammatory symptoms are present.

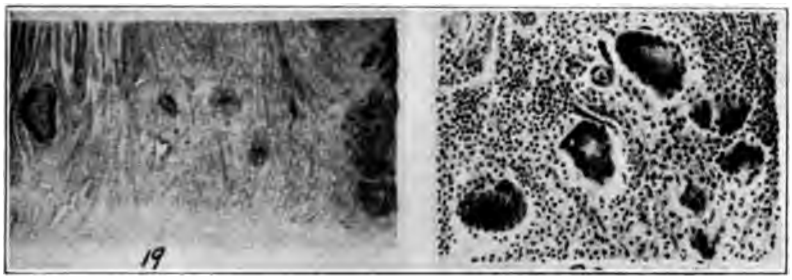


Fig. 313. Fig. 314.

Figs. 313 and 314.—Tuberculosis of vulvovaginal gland. Fig. 313, microscopic, low power. Fig. 314, high power, showing giant cells. (Davis—*Tr. Am. Assn. Obst. and Gyn.*)

The only affection that is liable to be confounded with this cyst is pudendal hernia. The distinguishing characteristics of hernia are marked increase of the trouble on straining, obstructive bowel disturbance, impulse in the mass on coughing, tympanitic percussion note over the mass (if containing bowel) and the possibility of partial or complete reduction into the peritoneal cavity.

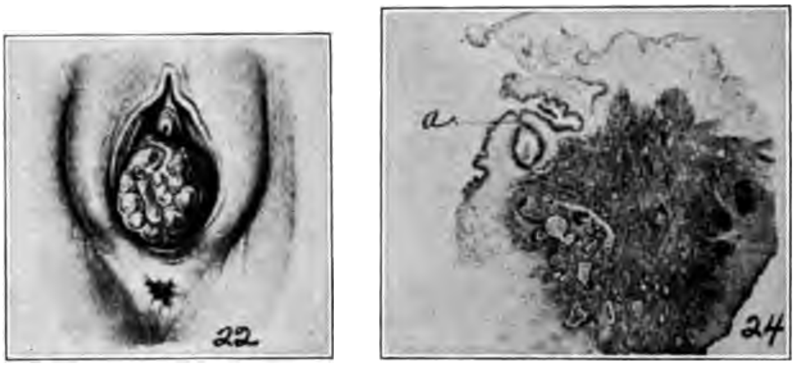


Fig. 315. Fig. 316.

Figs. 315 and 316.—Carcinoma of vulvovaginal gland. Fig. 315, gross appearance. Fig. 316, microscopic, low power. (Davis—*Tr. Am. Assn. Obst. and Gyn.*)

Treatment.—There are two cutting methods. One method is to **open the cyst** on the inner side, cut out some tissue on each side of the incision, so that it will not close easily, curet the inner surface of the sac and pack with antiseptic gauze. The external wound is kept open until the cavity is obliterated. In this method the treatment is prolonged and a sinus may result.

The other method is to **extirpate the cyst.** In extirpating the cyst, avoid cutting into it if possible, as it is much easier enucleated when distended than when collapsed. The resulting cavity is closed with sutures. To lessen the resulting depression at the site, the cyst should be dissected as closely as practicable from the surrounding tissues, and in closing, the surrounding tissues should be drawn in by sutures to fill the cavity. This extirpation method is the one of choice from the very first in all cases in which there is no contraindication to general anesthesia.

When the patient is not in good condition for a general anesthetic, the cyst may in some cases be extirpated by injecting a considerable quantity of a weak novocaine solution ($\frac{1}{2}$ per cent) or the Schleich solution No. 2 around the cyst and under it (infiltration method). This will do away with the greater part of the pain.

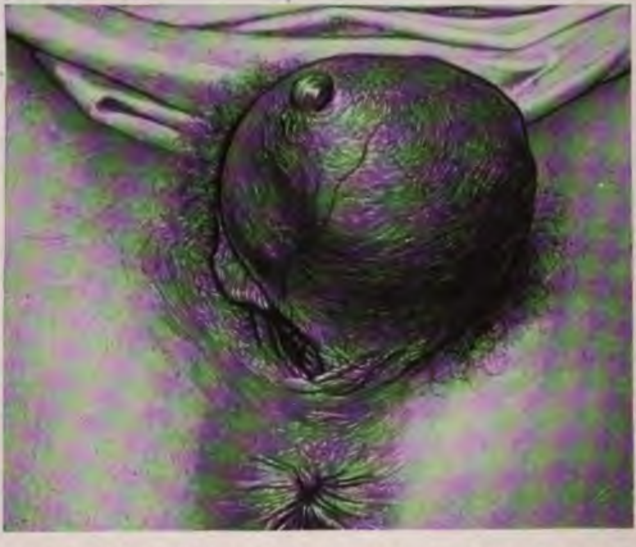


Fig. 317.—A large carcinoma of the left vulvovaginal gland. (Kelly—*Operative Gynecology.*)

Tuberculosis of the vulvovaginal gland occasionally occurs and must be kept in mind in any persistent ulceration of this region (Figs. 313, 314).

Carcinoma of the vulvovaginal gland (Figs. 315, 316, 317) constitutes one form of malignant disease of the external genitals.

CONDYLOMATA OF THE VULVA

Condylomata are small nonmalignant growths occurring about the vulva. There are three varieties.

1. The common wart, called also "verruca vulgaris."

2. The pointed condyloma, called also "condyloma acuminatum," "venereal wart" and "moist wart."

3. The flat condyloma, called also "condyloma latum."

Etiology, Pathology, Symptoms.—The common wart occurs rather frequently about the vulva. It is usually situated on the labia majora or mons veneris. The particular cause for it is not known. It is dry and sometimes much pigmented, but rarely causes any disturbance.

The POINTED CONDYLOMA or moist wart occurs on those parts of the vulva which are frequenty moist, namely, the vestibule, the vaginal entrance, the labia minora, the perineum and about the anus. In some cases they occur on the labia majora and even on the thighs (Figs. 318, 319).

They are usually associated with venereal disease but not necessarily so. They are small, pointed, papillary masses with a thick covering of epithelium (Figs. 318, 319, 320, 321, 322). They occur singly or in groups or in large numbers (Figs. 318, 319). They may vary in size from the head of a pin to a large cauliflower mass covering half or more of the vulva.

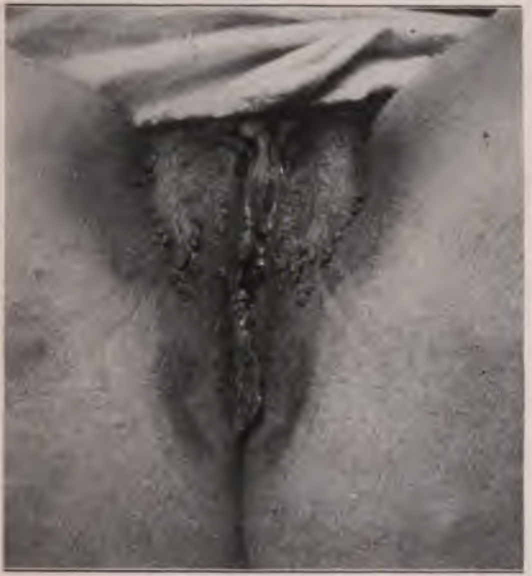


Fig. 318.—Scattered condylomata of the vulva. (Hirst—*Diseases of Women*.)

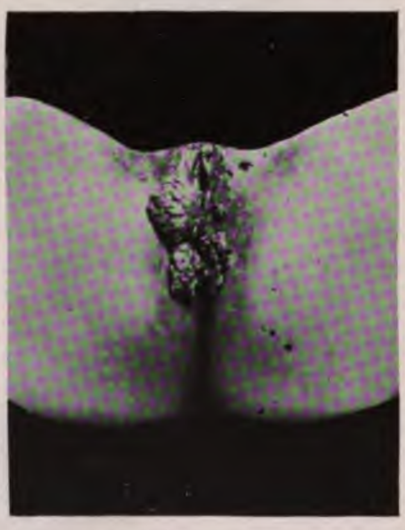


Fig. 319.—Small masses of condylomata. (Gilliam—*Practical Gynecology*.)

They are due to some irritating discharge, usually gonorrheal. Sometimes they are due to a simple discharge as, for example, the increased vaginal flow of pregnancy. When present during pregnancy they grow very rapidly. Whenever they are found, a careful search should be made for evidences of previous gonorrhea or other cause of persistent vaginal discharge.

Usually condylomata are not particularly painful or tender. In some cases they become inflamed and are then painful and may bleed easily. When the condylomata are multiple and grouped together in large masses, secretion is liable to lie in the interstices of the growth and become decomposed, giving rise to an offensive odor and considerable irritation. If situated near the meatus, considerable bladder irritability may result.

The FLAT CONDYLOMATA (Figs. 263, 264, 265) constitute the characteristic vulvar lesions of secondary syphilis. If the overlying epithelial layers are thrown off, the flat condyloma becomes a superficial ulcer, as mentioned under syphilis.

Treatment.—The **common wart** needs no treatment unless large or in some way troublesome. In such a case it may be removed the same as warts elsewhere, viz.: by excision of the wart and a portion of the underlying skin, the wound being closed by sutures. If the patient objects to this excision, the cannabis indica and salicylic acid mixture used for warts elsewhere may be applied. This is to be painted over the wart with a camel's-hair brush. It should be applied freely morning and evening, the hard crust over the top of the growth being occasionally removed, that the medicine may pene-

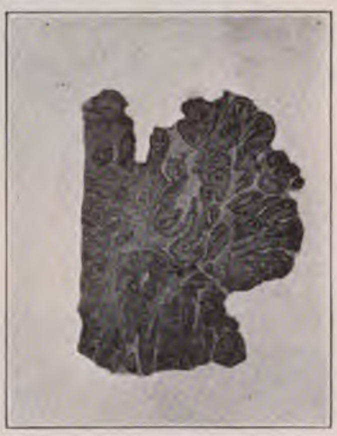


Fig. 320.—Pointed condyloma of vulva. Section, low power. Gyn. Lab.

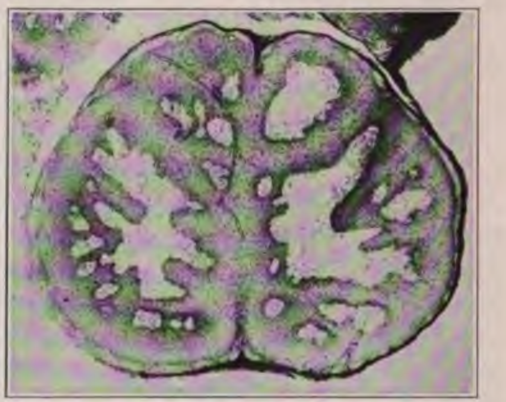


Fig. 321.—Cross section, showing marked increase in epithelial layer. Gyn. Lab.

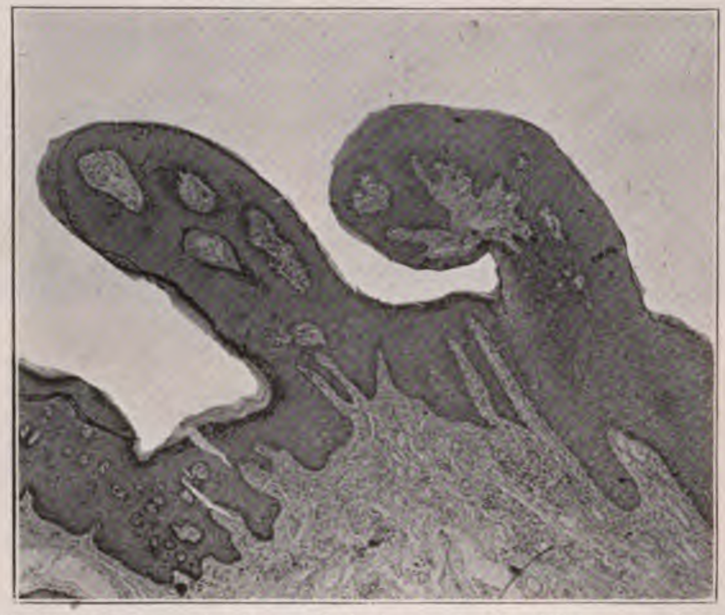


Fig. 307.—Case of abscess of vulvovaginal gland on each side. (Weiner—*Am. Jour. Obst.*)

trate deeper. This treatment continued for a week or two will often cause small warts to disappear, but it does not always do so. This treatment is rather tedious and uncertain, but it is not painful and may be tried.

The **pointed condylomata** are treated as follows:

1. Stop the irritating discharge which causes the condylomata. This requires an antiseptic vaginal douche, once, twice or thrice daily, depending on the amount of discharge. The douche removes the discharge from the vagina and prevents it irritating the structures around the vaginal entrance. In addition to the douche, the patient will probably require special treatment as indicated by the nature of the disease giving rise to the discharge.

2. Keep the condylomata clean and dry. This is accomplished by washing several times daily with an antiseptic solution, and then drying with absorbent cotton and dusting freely with some drying powder such as calomel or equal parts of bismuth subnitrate and prepared chalk or equal parts of salicylic acid and calomel. The patient is given a prescription for the required powder and directed to dust it on freely several times daily. In the office treatment, silver nitrate stick or a strong solution may be applied as a cauterant, or carbolic acid may be used as a cauterant, after anesthetizing the growth by the application of cocaine solution (20 per cent). Another excellent cauterant application is pure formol, applied after the use of a cocaine solution to prevent pain.

3. Excision is the best plan to adopt when there are only a few separate condylomata. The growths are snipped off with the scissors and the base of each touched with carbolic acid or liquor ferri subsulphatis to stop the bleeding. If the base is wide and considerable pain is anticipated, a few drops of novocaine solution (½ per cent) may be injected under the growths before excision. If there is free bleeding the little wound may be closed with a suture. When a large mass has formed (Fig. 319) with a broad and vascular base, perhaps extending into the vagina, it is better to give the patient a general anesthetic and remove the growth thoroughly with the scissors and curet.

In PREGNANCY it is well to get along if possible with local cleanliness and drying powders and mild astringents. Any operative measure, such as excision of the condylomata or cauterizing them, may lead to miscarriage. In many cases the simple measures above mentioned will effect a cure. But when the condylomata are not cured by the simple means, particularly if the growth is extensive, the patient should be anesthetized and the mass entirely removed. Though miscarriage or premature labor may result from such treatment, it is not probable and with such a case some risk must be taken. If large condylomata, that retain secretion in the crevices, are allowed to remain until labor, they become a source of great danger to the mother on account of the liability to puerperal sepsis. There is danger to the child also, particularly in gonorrheal cases, because of the liability to eye-infection and destructive ophthalmia.

The **flat condylomata** require the regular constitutional treatment for secondary syphilis. Locally, cleanliness should be secured by frequent washing with a carbolic or other antiseptic solution. If there is much vaginal discharge, antiseptic vaginal douches should be given. Each time the parts are washed, they should be dried thoroughly with absorbent cotton and dusted freely with some drying powder. Calomel makes an effective drying powder in these cases.

If there is troublesome itching or smarting, the lesions may be touched occasionally with silver nitrate solution (10 per cent). If an ulcer forms, it requires the treatment for ulcer, given elsewhere.

STASIS HYPERTROPHY OF VULVA

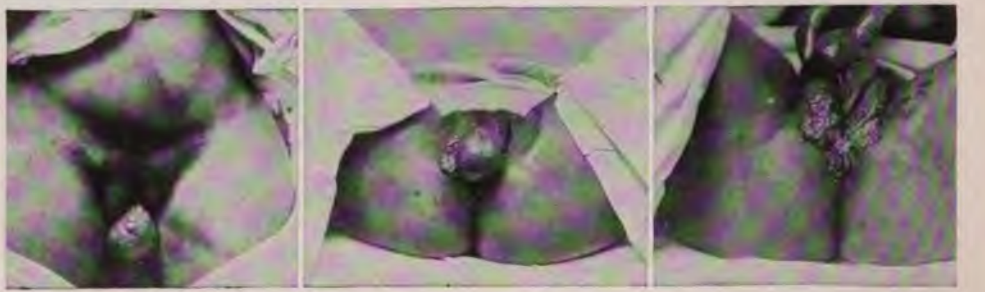


Fig. 323.—Stasis hypertrophy of vulva due to syphilitic ulceration. (Stein—*Surg., Gynec. and Obst.*)

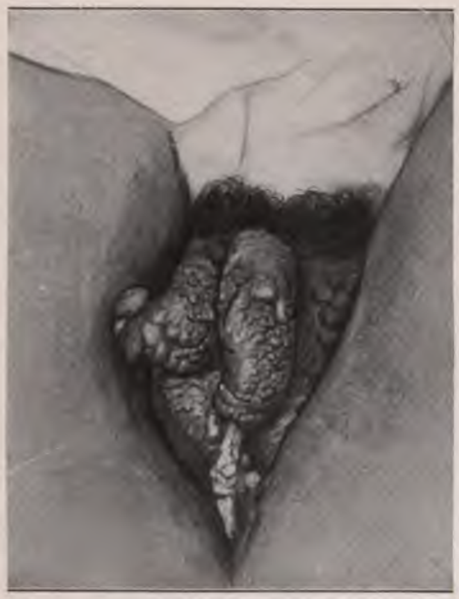


Fig. 324.—Stasis hypertrophy of the vulva. (Hirst—*Diseases of Women.*)

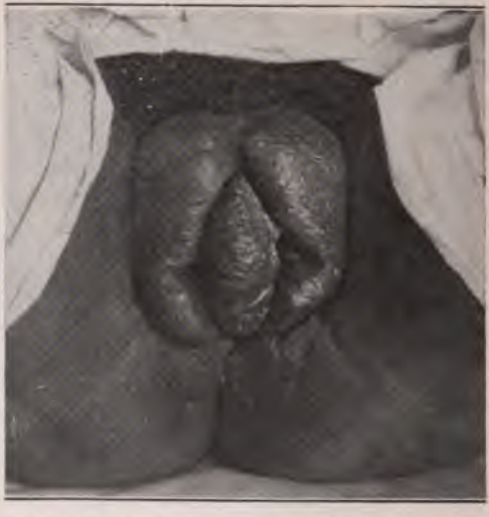


Fig. 325.—Stasis hypertrophy of the vulva. (Hirst—*Diseases of Women.*)

Stasis hypertrophy of the external genitals is a chronic enlargement of the same, due principally to interference with the lymph circulation (Figs. 266, 267, 323, 324, 325, 326, 327). "Elephantiasis" is the term under which most authors describe this condition, but the import given to this word varies so much that its use leads to confusion. It has been applied on the one hand indiscriminately to nearly all chronic enlargements of the labia and, on the other hand, as a special term for the designation of the swelling due to the local invasion of the lymph channels by a parasite (filaria sanguinis hominis). To prevent this confusion it is best to adopt another term, one about which there can be no misunderstanding and which indicates the most important factor in the evolution of the clinical picture. The essential lesion is a stasis hypertrophy, whatever the cause of the stasis may be. As explained below under etiology, the stasis may be due to persistent ulceration with resulting scar-tissue, or to an obstructive disturbance in the inguinal lymph glands or to local invasion of lymphatics by a parasite (filaria). The term "ulcus rodens" given to the condition by some writers, is very good for designating that peculiarly persistent form of ulceration which is a prominent feature in many of these cases, but as a term for the whole clinical picture it is not appropriate. The hypertrophy may be present without ulceration and, on the other hand, a rodent ulcer may be present without particular hypertrophy. Stasis hypertrophy does not include the following forms of vulvar enlargement:

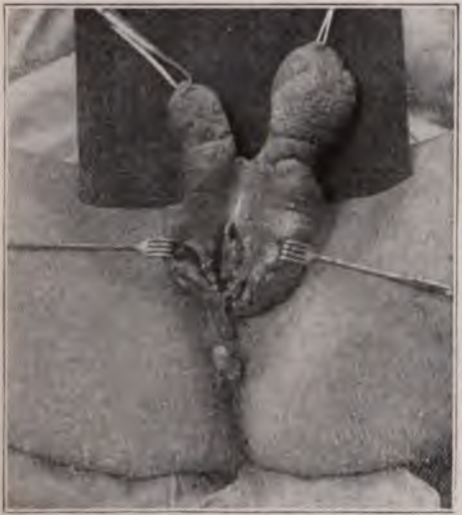


Fig. 326.—Stasis hypertrophy of vulva. The masses have been raised, showing remnants of the old ulceration and scar tissue about the pubic arch, which is usually responsible for this condition. (Kiliani—*Surgical Diagnosis.*)

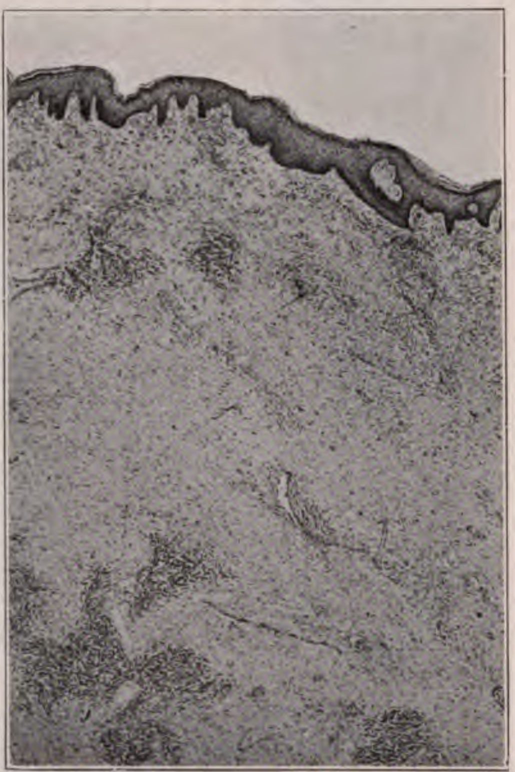


Fig. 327.—Stasis hypertrophy of vulva. Notice the thickened epithelium, the edematous appearance of the underlying tissues and the accumulation of round cells about the blood and lymph vessels. Gyn. Lab.

a. Malformations, or the condition known as "congenital elephantiasis," which is in reality a kind of soft myoma.

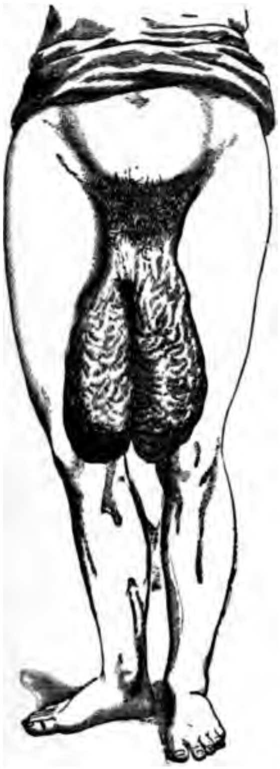


Fig. 328.—Elephantiasis of the labia. (Baldy—*American Textbook of Gynecology.*)

b. The slight enlargement of one or both labia minora, without lymph obstruction (Fig. 328). This is supposed to be due to frequent irritation of the structures by masturbation. The clitoris may be affected (Fig. 331).

c. The enormous enlargement of the labia minora seen in some barbarous tribes, particularly the Hottentots (Fig. 356). This is due not to lymph stasis, but to certain manipulations practiced on the female children, particularly stretching of the parts manually or by weights.

d. Fibroma, lipoma, hematoma, carcinoma, sarcoma, ordinary edema, acute inflammatory enlargement, hernia.

e. The slighter degrees of enlargement found in the various forms of vulvar ulceration, namely, in the syphilitic, tuberculous, malignant and rodent ulcers. In each of these conditions, when present for some time, there is usually slight stasis hypertrophy, but the disease giving rise to the ulceration is the important feature and hence the case should be classed under syphilis or tuberculosis or malignant disease or rodent ulcer. However, with syphilis or rodent ulcer, as the case continues the hypertrophy may in time become the most important feature and then the case could properly be classed as one of stasis hypertrophy. If this fact of the possible overlapping of these terms were kept in mind and yet a definite meaning were attached to each term when used, much confusion would be avoided. The term **elephantiasis** should be reserved for those cases of vulvar enlargement in which the enlargement

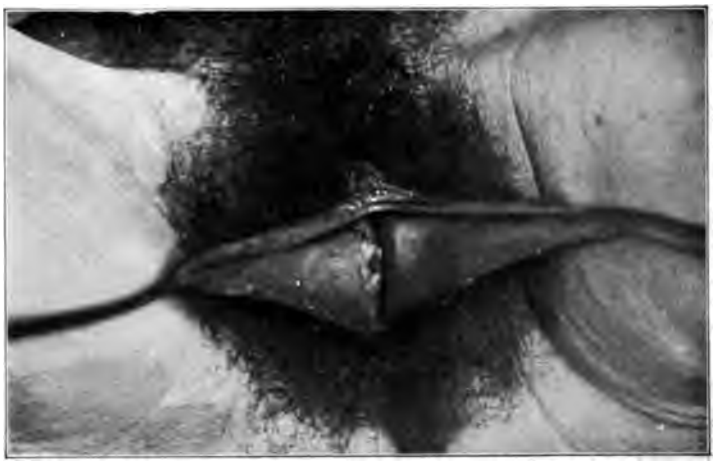


Fig. 329.—Hypertrophy of the labia minora. (Hirst—*Diseases of Women.*)

becomes very great, i.e., of really elephantine proportions (Fig. 330), more commonly seen in negro women.

Etiology.—There are thought to be three causative factors:

1. Chronic ulceration about the vulva, usually syphilitic. This has long been recognized as an etiologic factor in the majority of cases. In most cases, the ulceration spreads at one point and heals at another, forming scar-tissue. The contraction of the scar-tissue, and of the inflammatory infiltration under the ulcer, obstructs the circulation, particularly of the lymph, and causes stasis, chronic irritation, infiltration and hypertrophy of the tributary structures. This same ulceration may lead to infection of the lymph glands and the obstructive condition mentioned in the next paragraph. In Fig. 326, the masses are raised to show the ulceration beneath.

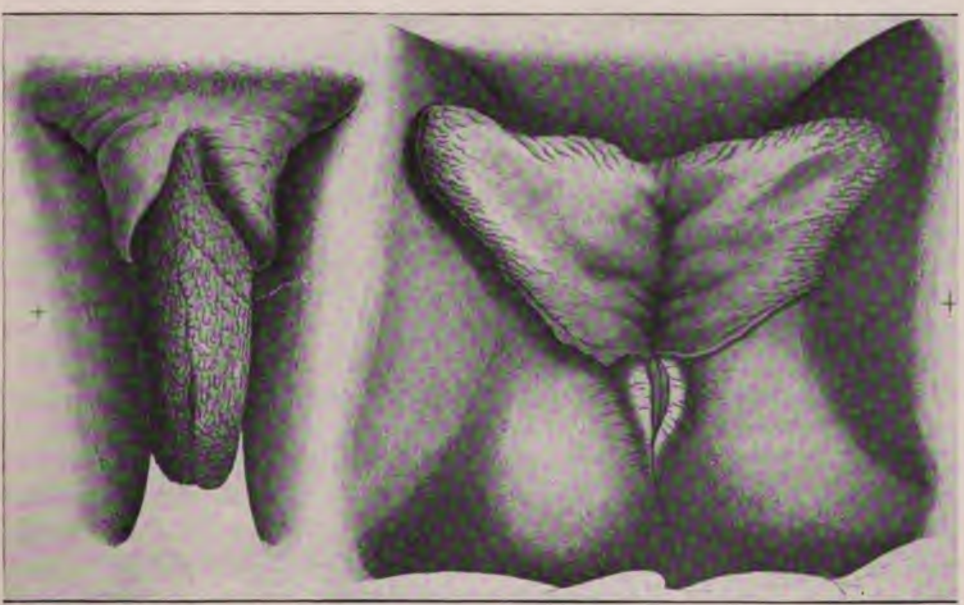


Fig. 330.—Enormous hypertrophy of the labia minora—the so-called "Hottentot Apron." The first cut shows the patient standing, with the hypertrophied labia hanging between the thighs. The second cut shows the patient on her back, with the labia separated. (Garrigues, after Zweifel—*Diseases of Women*.)

2. Obstructive changes in the inguinal lymphatic glands. This factor was brought out by F. Koch, and helps to account for those cases in which there has been no extensive ulceration. The obstruction of the lymph glands by disease of these structures may be an important factor also in those cases accompanied by, and apparently due to, chronic ulceration. The closing of these lymph highways through the glands may be brought about by extirpation of the glands or by suppuration of the same, or even by inflammatory or degenerative processes that stop short of suppuration, such, for example, as tertiary syphilis.

3. Local invasion of the vulvar lymphatics by the Filaria sanguinis hominis. This is rare or unknown in this country, but it occurs as an endemic affection in some countries (India, Barbadoes and the Antilles). Mosquitoes are thought to deposit the embryo beneath the epidermis. There the parasite multiplies to such an extent as to choke the lymph channels, the obstruction being due to both the parasites proper and the ova.

Stasis hypertrophy is a rather common affection among prostitutes, in whom the irritation from frequent coitus and from various infections and from lack of cleanliness, tends to keep up indefinitely the chronic ulceration, which usually precedes and accompanies the hypertrophy. In this class, chronic ulceration is favored also by the depressed general health and in many cases by tertiary syphilis or the postsyphilitic state. The postsyphilitic state probably predisposes to stasis hypertrophy by producing poor tissue resistance which favors chronic ulceration, and also by producing a change in the local lymph glands which interferes more or less with the flow of lymph through them.

Taussig (Am. Jour. Obst. and Gynec., March, 1922) calls attention to two other etiological factors—(a) a racial predisposition to fibrous hypertrophy in the negro, which race furnishes most of the cases, and (b) the looseness of the vulvar skin, predisposing to edema.

Pathology and Symptoms.—There is marked hyperplasia of the skin and subcutaneous tissues, and the lymph spaces are dilated. There is usually considerable round cell infiltration and connective tissue proliferation (Fig. 327). In some cases there is infection of the lymph spaces and the formation of pockets of pus, but this is not a part of the essential pathology of the disease. In the absence of infection, there are no evidences of acute inflammation in ordinary stasis hypertrophy.

The enlarged structures have about the normal color. The skin may be smooth (glabrous variety) or rough and warty (verrucous variety) with marked exaggeration of the normal skin folds. The process may affect the clitoris alone or one of the labia alone or it may affect all of the structures simultaneously or in succession.

There is usually present more or less chronic ulceration. In that variety due to the filaria, the parasite and ova are found choking the lymph spaces and there are also evidences of acute inflammatory reaction. The enlargement in stasis hypertrophy may vary in size from a small thickening, hardly noticeable, to a mass so large as to prevent coitus and interfere with walking.

Examination reveals the enlargement and usually also the ulceration and scar-tissue (Fig. 326). In the absence of infection, there are no acute inflammatory symptoms and usually but little congestion.

The patients complain of some discharge and itching about the genitals and not infrequently symptoms of irritation on the part of the bladder and rectum. What usually brings the patient to the physician is the discharge and enlargement, with resulting discomfort and inconvenience in walking and difficulty in coitus.

Diagnosis.—Tertiary **syphilitic** lesions of the vulva not infrequently cause considerable stasis hypertrophy (Figs. 266 to 270). Consequently the question of syphilis must be investigated in all cases. When occurring in syphilitics it is often referred to as "syphiloma."

From stasis hypertrophy we must distinguish **tuberculosis** of the vulva and malignant disease, by the special diagnostic points given under each. To be distinguished also are fibroma, lipoma, hernia and the enlargement of the labia minora previously mentioned.

In that rare form of stasis hypertrophy due to the filaria, considerable acute inflammatory reaction follows the invasion of the lymph spaces by the parasite and at this stage it is very liable to be mistaken for erysipelas or ordinary **cellulitis.** After these acute symptoms subside the brawny induration remains. Acute exacerbations occur at irregular intervals and with each exacerbation there is a decided increase in the hypertrophy. If pus infection of the dilated lymph spaces takes place, abscesses and sinuses form.

Treatment.—The treatment of stasis hypertrophy is naturally divided into two parts—that for the ulceration and skin irritation, and that for the swollen structures.

The first consists in **cleanliness** and the employment of the measures mentioned under ulcer and under vulvitis. If syphilis is found, it must receive appropriate treatment.

The treatment for the large masses is **excision.** In some of the milder cases the removal of the irritation and dermatitis and the treatment of the ulceration, will do away with part of the swelling (the coincident edema) and relieve the patient so much that she is comfortable. In most cases, however, particularly where the enlargement is marked, the masses should be removed. In some cases the masses are so much in the way that they must be removed before the ulceration can be satisfactorily treated. But on account of the danger of infection the ulceration should be healed as far as possible and all the dermatitis removed before excision of the mass. Infection is particularly dangerous in these cases on account of the great dilatation of the lymph spaces, and strict antiseptic care must be employed in handling them.

The best way to remove such a mass is by clean excision with the knife or scissors and closure of the resulting wound with numerous sutures. Bleeding is free and many artery forceps are needed to catch the small vessels. When there is a large mass with a broad pedicle, it is best to close the wound immediately, a little at a time as the incision is extended and the mass gradually excised. In this way the sutures stop the bleeding at once, no ligatures are necessary and comparatively little blood is lost.

The older method of removal with the cautery leaves a broad surface to heal by granulation and there is much resulting scar-tissue and distortion. Except in the cases of very small pedicle, it is inferior to excision with the knife. The knife excision leaves the edges of the wound in condition for accurate approximation and rapid union with a minimum amount of scar-tissue.

NONMALIGNANT TUMORS OF VULVA

Fibrous tumors (fibromata) may occur in the connective tissue of the vulva. They are rare. When present they usually involve one of the labia majora (Fig. 332).

In some tumors there are also bundles of muscular tissue, evidently derived from the muscle fibers of the round ligament or of the skin. Such tumors are of course fibromyomata. Some tumors have a preponderance of fat (lipomata), the connective tissue simply forming trabeculae between the fat lobules. Still other tumors contain myxomatous tissue, giving the myxofibromata and the myxo-lipomata. A very rare form of tumor in this region is the chondroma. A few cases of chondroma of the clitoris have been reported, in at least one of which considerable ossification had taken place.

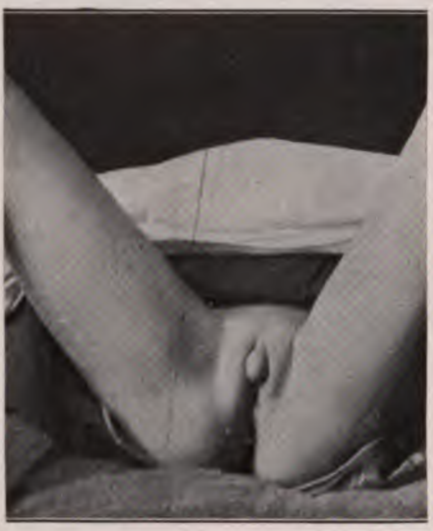


Fig. 331.—Hypertrophy of the clitoris. (Hirst—*Diseases of Women.*)

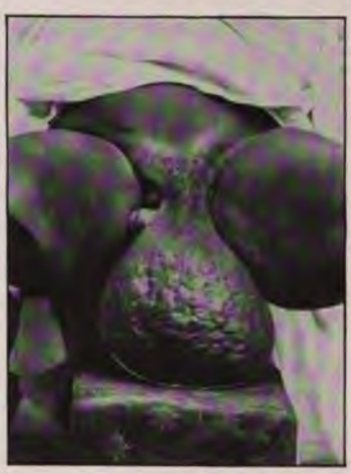


Fig. 332.—A large fibroma of the labium. (Montgomery—*Practical Gynecology.*)

These nonmalignant tumors of the vulva may vary in size from an acorn to a child's head. They present, in this locality, the same symptoms and signs that characterize them elsewhere. The patient complains principally of the weight of the growth and of its being in the way. When large, they become pedunculated. On account of the friction the surface may become abraded and infected and ulcerated, adding greatly to the patient's distress. The treatment for these growths is excision.

NONMALIGNANT TUMORS OF VAGINA

Solid tumors (fibroma, myoma, adenomyoma) occasionally develop in the vaginal wall. Such a tumor may be mistaken for hernia, rectocele, cyst, or a malignant tumor. Solid tumors in this situation are so rare as to require no detailed consideration, but the possibility of their existence must be kept in mind when endeavoring to determine the character of the swelling in this region.

When large enough to cause trouble, they require extirpation.

CYSTS OF VULVA

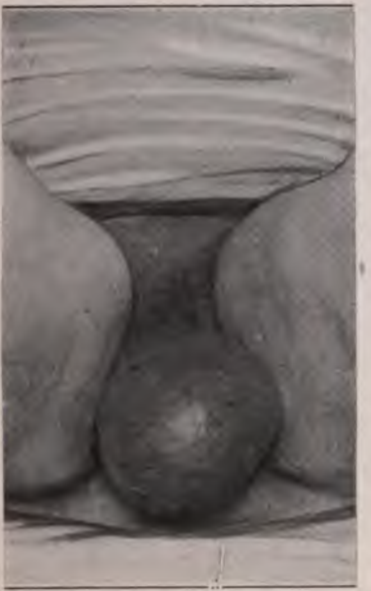


Fig. 333.—A large labial cyst. (Hirst—*Diseases of Women.*)

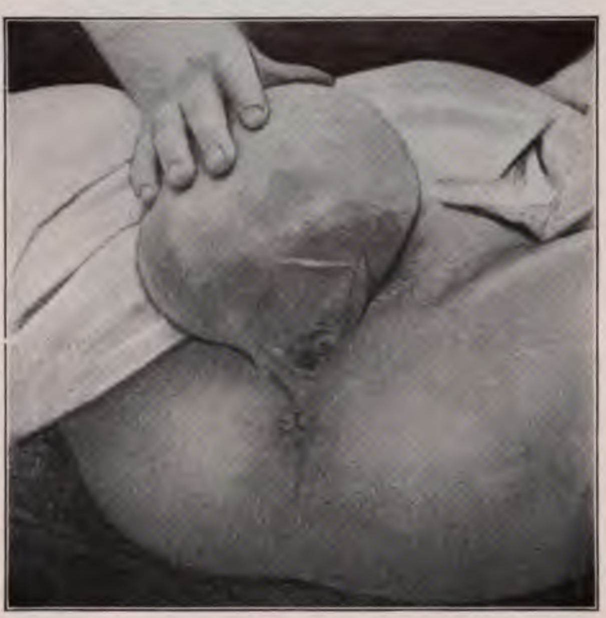


Fig. 334.—Another large labial cyst. (Hirst—*Diseases of Women.*)

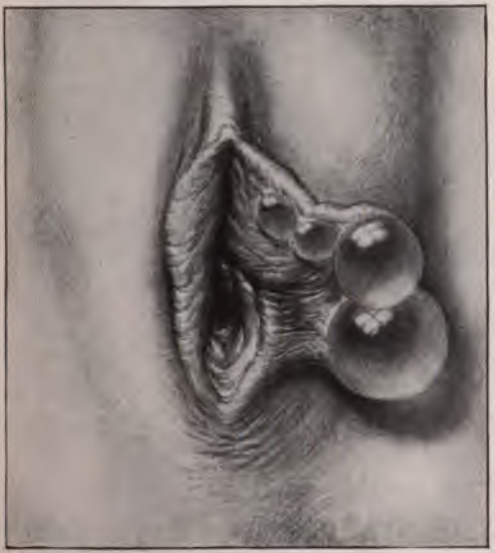


Fig. 335.—Small cysts of the left labium minus. (Kelly—*Operative Gynecology.*)

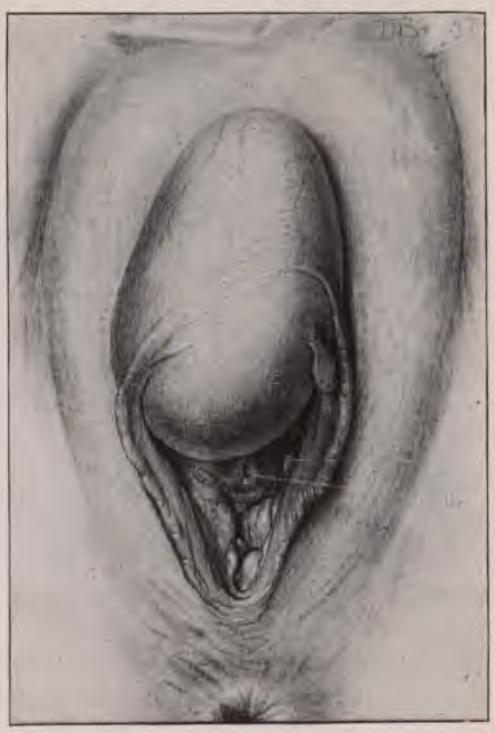


Fig. 336.—A cyst of the clitoris. (Kelly—*Operative Gynecology.*)

Occasionally sebaceous cysts occur on the labia majora or the mons veneris. They present the same characteristics and require the same treatment as sebaceous cysts elsewhere. Other cysts occur from remnants of fetal structures. Figs. 333 and 334 show large labial cysts. Cysts of the vulvovaginal gland have already been considered.

Several cysts of the labia minora have been reported (Fig. 335). It is generally supposed that they arise from embryologically misplaced glandular rests. If large enough to be troublesome they are to be excised. Fig. 336 shows a cyst of the clitoris.

CYSTS OF VAGINA

Vaginal cysts are rare and their origin is not certain. Some are supposed to arise from the remains of the duct of Gartner (Fig. 826), but others are found in other situations (Figs 337 to 340). Vaginal cysts vary in size from the end of the finger to as large as the fist and even larger. In some cases the vaginal wall is separate from the cyst and moves freely over it, while in other cases the vaginal wall is closely adherent to the cyst, apparently forming part of it.

The contents of the cyst may be like serum or may be milky or may be dark and thick, the color and consistency depending on the amount of hemorrhage into the cyst cavity.

Diagnosis.—The cyst differs from vaginal HERNIA in that it is of gradual development without apparent cause, gives, on coughing, no impulse separate from the adjacent vaginal wall, cannot be reduced and is not associated with intestinal disturbance. The cyst differs from vaginal ABSCESS in that inflammatory symptoms are absent. In some cases, infection of the cyst contents takes place and the cyst becomes an abscess. In such cases it is distinguished from a simple abscess by the presence of a swelling long before the inflammatory symptoms developed. In some cases a swelling that appears to be a vaginal cyst is simply a pocket from the urethra (suburethral abscess). Before subjecting a patient to operation, it is well in a doubtful case, to draw off a small quantity of fluid from the supposed cyst with an aspirator that the diagnosis may be confirmed.

Two other conditions that should receive attention in the differential diagnosis of vaginal cyst are, double vagina and double ureter. In a case of DOUBLE VAGINA the second vagina may be completely shut off and filled with old menstrual blood. It would usually be somewhat larger and less tense than the ordinary vaginal cyst, though the latter is frequently of considerable size. There would be double uterus and the relation of the mass to the uterus would point to one-sided hematocolpos. From HYDROURETER or a SUPERNUMERARY URETER, the differentiation would also be rather difficult and depend principally on the shape and tension of the swelling. In a case of double ureter, if one ended blindly alongside the vagina and became distended with urine it would form a mass which would be more sausage-shaped and have less tension than a vaginal cyst. A puncture of the mass with an aspirator needle,

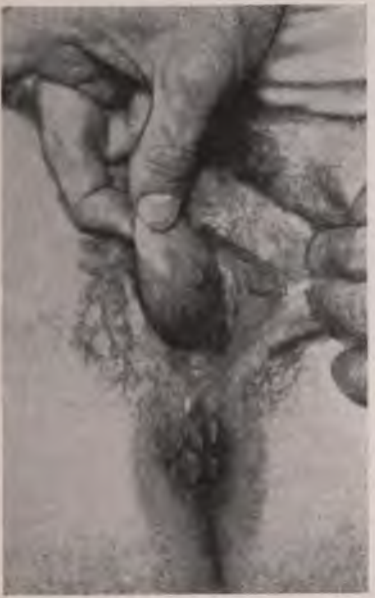


Fig. 337.—Cyst of vaginal wall arising from Gaertner's duct. (Ingraham—*Jour. Am. Med. Assn.*)

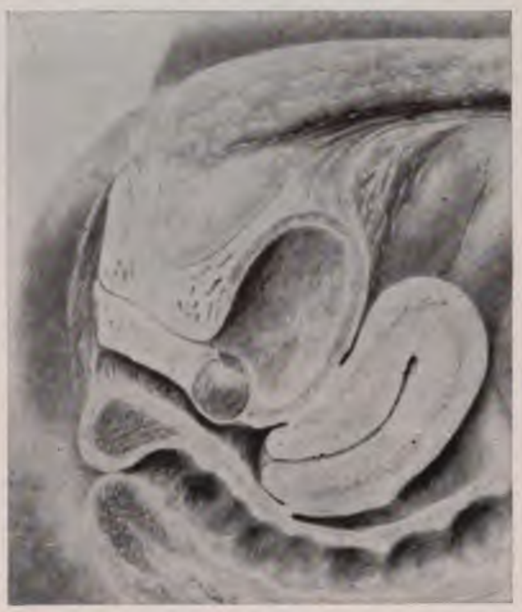


Fig. 338.—Dermoid cyst of vagina which has ulcerated into bladder. (Quinby—*Jour. Am. Med. Assn.*)

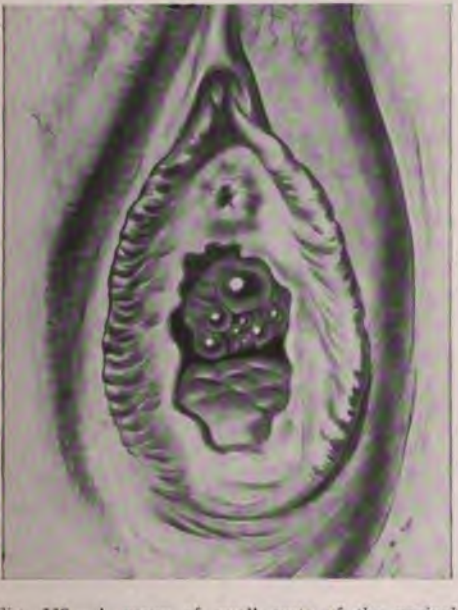


Fig. 339.—A group of small cysts of the vaginal wall. (Montgomery—*Practical Gynecology.*)

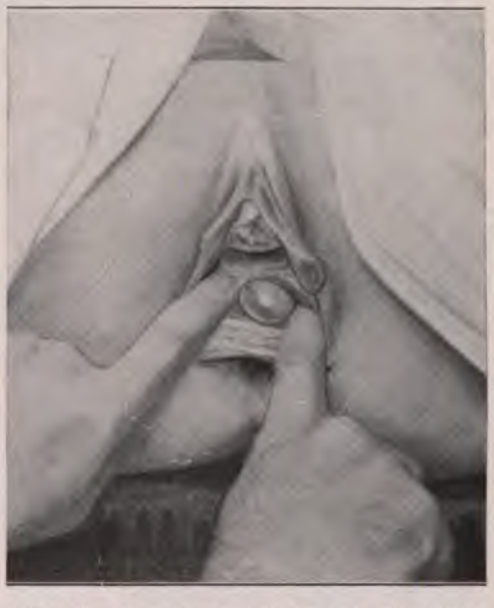


Fig. 340.—A small cyst of the vaginal wall. (Hirst—*Diseases of Women.*)

of course aids greatly in differentiating between these conditions—the presence of blood speaking for hematocolpos, and of urine for hydroureter.

Hernia must be carefully excluded before aspirating, or fatal peritonitis may result. If it is intended to remove the cyst by operation, only a small amount of fluid should be removed for diagnostic purposes, for the extirpation is more easily carried out when the cyst is distended than when collapsed.

Treatment.—If the cyst is large and troublesome, the most satisfactory way of dealing with it is by extirpation, provided it is situated in the lower part of the vagina where complete extirpation is practicable. A cyst due to remains of Gaertner's duct may extend up into the broad ligament, a point to be kept in mind in attempted removal. If a cyst is so situated that it cannot be completely extirpated, remove a large part of the wall, curet the remaining portion and pack with gauze, and treat as an abscess cavity. If the patient is averse to operation, the cyst may be simply emptied by aspiration. There is a possibility that it will remain collapsed for some time or even permanently. However, the probability is that it will refill in a short time and that extirpation will be necessary.

If the cyst is first discovered during pregnancy, do not disturb it until labor begins. When labor comes on and the child's head is beginning to press into the pelvis, empty the cyst with an aspirator, to give room for the passage of the child. Do not attempt extirpation of the cyst or incision and drainage, until the patient has recovered from parturition.

PUDENDAL HERNIA

A pudendal hernia is a protrusion of the intestine or omentum or other intraabdominal structure into the external genitals. It may take place by way of the inguinal canal in which case the hernia is designated as "inguinolabial" or "superior labial."

The protrusion may take place by way of the vagina, in which case the hernia is designated as "vaginal," "vaginolabial" or "inferior labial."

Inguinolabial Hernia.—The round ligament ends in the tissues at the

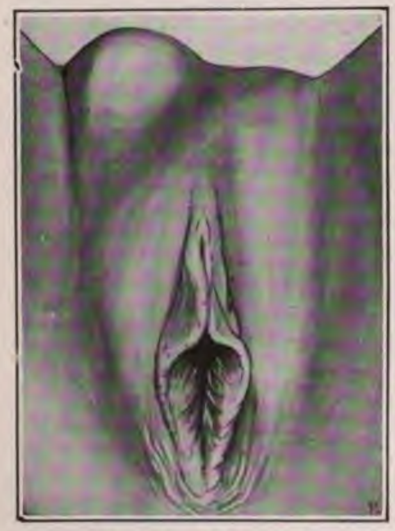


Fig. 341.—Pudendal hernia. Inguinal hernia becoming labial. (Dudley—*Practice of Gynecology*.

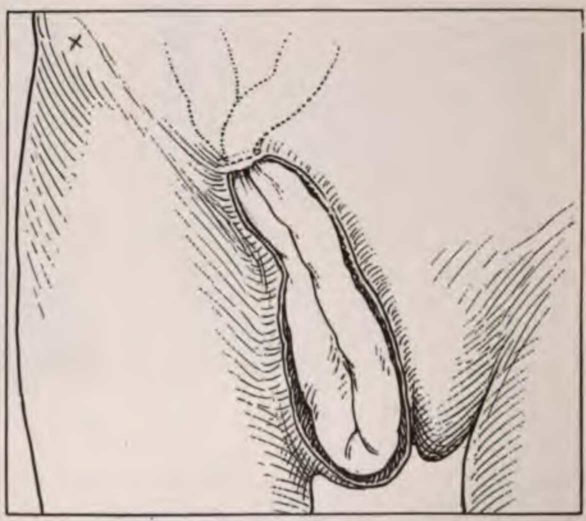


Fig. 342.—Inguinolabial hernia, diagrammatic.

top of the labium majus. In the fetus, the ligament is accompanied along the inguinal canal by a prolongation of the peritoneum, forming a small cavity. This is usually obliterated in the full term fetus. In some cases, however, it is not obliterated but remains open, forming a small pocket or "canal of Nuck," and along this canal an inguinal hernia may take place. The hernia may advance no further than the inguinal ring or, on the other hand, it may protrude more and more, involving the upper part of the labium majus and later the whole labium (Figs. 341, 342). It corresponds to scrotal hernia in the male and presents practically the same pathology and symptoms. In some cases other structures than the intestine or omentum have been found in such a hernia-sac, for example, the ovary, fallopian tube, uterus and even the pregnant uterus.

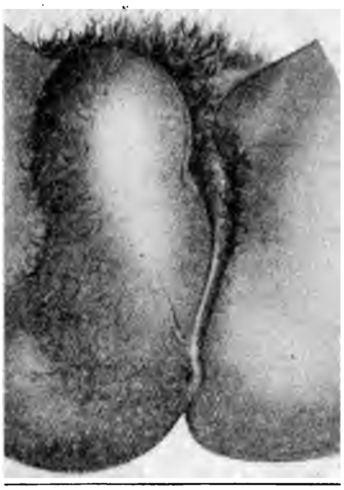


Fig. 343.—Vaginolabial hernia. (H. Macnoughton-Jones, after Winkel—*Diseases of Women.*)

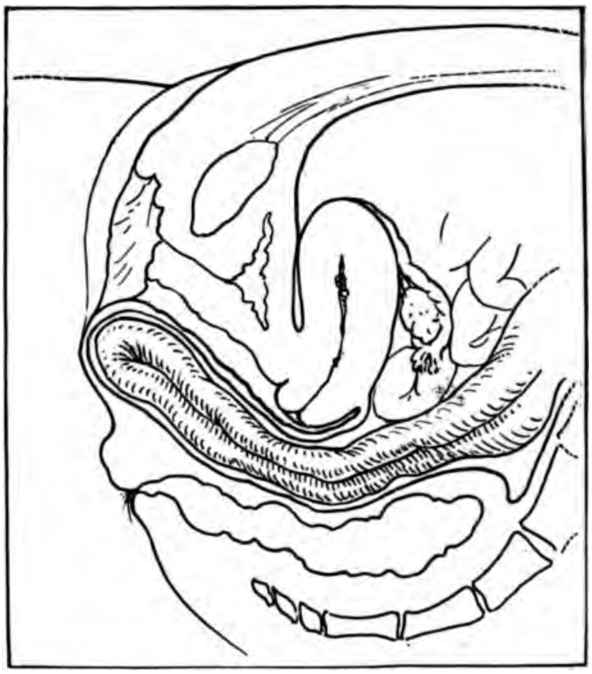


Fig. 344.—Vaginolabial hernia, posterior type, diagrammatic.

Vaginolabial Hernia.—In rare cases a hernial protrusion may take place through the pelvic outlet by way of the vagina. In such a case the hernia may descend in front of the broad ligament, between the uterus and the bladder or behind the broad ligament between the uterus and the rectum. In either case the hernial tumor appears first in the vagina and, as it grows larger appoaches the vaginal opening and distends the lower part of one labium (Figs. 343 to 347). In this situation it produces an appearance somewhat resembling a vulvovaginal cyst, for which it may be mistaken.

Diagnosis.—Hernia differs from other swellings in this region, for example, hematoma, cyst, fibroma, stasis hypertrophy, cellulitis, in the following particulars:

IMPULSE ON COUGHING, however, may be absent if stranguation has taken place.

RESONANCE ON PERCUSSION is present only if the mass contains intestine. It is not found with omentum or ovary or tube.

MAY BE REDUCED INTO ABDOMINAL CAVITY.—This, of course, is possible only in reducible hernia. If the supposed hernia cannot be reduced with the patient in the dorsal position, she may be placed in the knee-chest posture and the reduction again attempted. This is especially effective in the vaginal form of hernia.

INTESTINAL OBSTRUCTION.—Usually there is not enough obstruction to produce serious symptoms or interfere with the passage of the intestinal contents, but when evidence of such obstruction does occur it is a very important diagnostic symptom.

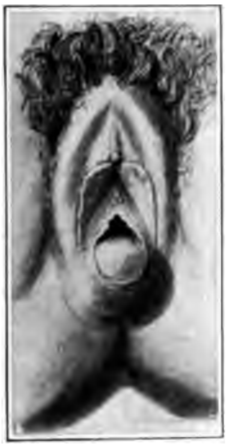


Fig. 345.

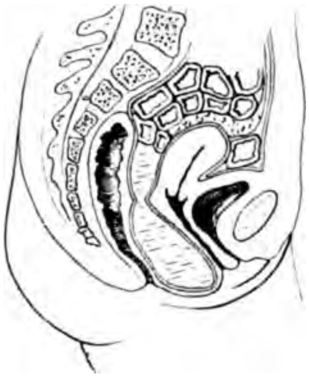


Fig. 346.

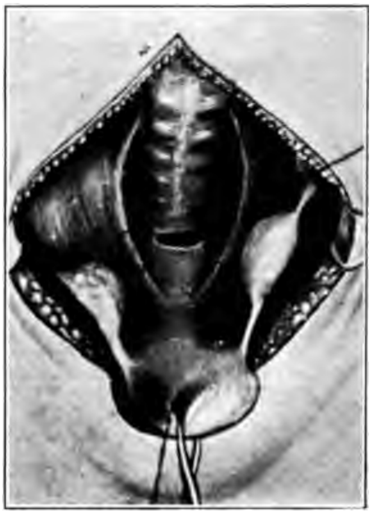


Fig. 347.

Figs. 345 to 347.—Case of vaginolabial hernia, posterior type. Fig. 345. Appearance of genitals. Notice the distention of the posterior vaginal wall and the perineum. Fig. 346. Sectional view, diagrammatic, indicating the location of the hernial sac and the point of constriction. Fig. 347. Appearance internally with the abdomen opened. Notice the hernial opening at the bottom of the retrouterine peritoneal culdesac. (Sweetzer—*Annals of Surgery*.)

HISTORY.—Hernia usually appears in conjunction with some straining effort. Hematoma of the vulva is usually due to some external injury. Cellulitis follows a wound or ulcer. Stasis hypertrophy is preceded by chronic ulceration and scar-tissue formation. The other swellings of this locality (cyst, tumor) develop gradually and without apparent cause.

Treatment.—The treatment for hernia in this situation is the same as for hernia elsewhere, namely, reduction and retention of the replaced viscera within the abdominal cavity, if that can be satisfactorily accomplished. An INGUINOLABIAL hernia can frequently be retained with the ordinary hernia truss. If the reduction cannot be accomplished or if satisfactory retention cannot be secured, then operation for the radical cure of the hernia is indicated.

In the form of pudendal hernia in which the protrusion takes place by way of the pelvic outlet and vagina (VAGINOLABIAL), there is seldom enough obstruction at the hernial opening to produce intestinal symptoms. When the patient is placed in the knee-chest posture, the protruding mass returns within the abdominal cavity and in some cases satisfactory retention may be secured by means of a pessary that puts the vaginal walls on the stretch or that plugs the vaginal canal. Various forms of pessary may be tried until an effective one for that particular case is found. In some cases the uterine supporter, consisting of an abdominal belt and vaginal stem supporting a hard rubber cup or ball, is the most satisfactory form for the vaginal hernia (see under uterine prolapse, Chapter VII).

Where only temporary retention is needed, as at the beginning of labor, the vagina may be packed with gauze or cotton and the patient kept in bed and if necessary in Sims' posture, or in the dorsal posture with hip elevated on pillows. If the hernia still persists in coming down the patient may be propped up for a time in a modified knee-chest posture, care being taken that the abdomen is free from constriction or pressure, so that the intestines may fall to the upper part of the abdominal cavity. A vaginal hernia associated with pregnancy and labor makes a serious complication and requires careful handling for there is always the danger that the hernia may be caught and held in front of the advancing head, with fatal results.

A vaginal hernia causing serious symptoms, which cannot be relieved by other measures, requires operation for the permanent closing of the hernial opening. In a case in which the hernial opening can be satisfactorily reached for operative closures by way of the vagina, that route for the operation should be chosen as it is less dangerous.

In other cases abdominal section is indicated.

PUDENDAL HYDROCELE

In some patients, a canal persists along the round ligament, the internal end of the canal being closed. If a collection of fluid takes place in the sac thus formed, the result is a pudendal hydrocele, corresponding to hydrocele of the cord in the male. It is called also "labial hydrocele" and occupies the same location as an inguinal hernia.

It differs from hernia in that it is dull on percussion, cannot be reduced. gives little or no impulse on coughing, is not associated with evidences of intestinal obstruction and has developed gradually without apparent cause. Great care is necessary in diagnosticating this rare affection, for it would be fatal to mistake hernia for hydrocele and treat it by injection. It must be differentiated also from cystic adenomyoma of the round ligament. Several such cases have been reported. In hydrocele, the cyst wall would be thinner than in the cystic adenomyoma, though in some of the cases the adenomyoma can only be distinguished microscopically. Pudendal hydrocele must be differentiated also from hernia of the ovary with cystic degeneration.

Treatment.—If the collection of fluid is small and causes no inconvenience, leave it alone or have the patient rub in some ointment, such as oleate of mercury, once daily with gentle massage. If the swelling causes trouble, the sac may be opened and extirpated and the wound closed by sutures. This is more certain of cure and much safer than injection treatment.

HEMATOMA OF VULVA

A hematoma is a collection of blood in the tissues. The genitals are very vascular and also present much loose subcutaneous tissue into which hemorrhage may take place with but little resistance until a large mass is formed (Fig. 348).

Pregnancy, pelvic tumors and other conditions that increase the vascularity of the parts, predispose to hematoma. The exciting cause is an injury that starts subcutaneous bleeding. A severe injury caused by a fall astride some object is very liable to cause hematoma. The bruising of the tissues by the child's head in labor or by the obstetric forceps may cause hematoma. A slight subcutaneous surgical procedure about the genitals, such as puncture of a cyst with a hypodermic needle, may be followed by a hematoma. For this reason it is important in puncturing a cyst of the vulvovaginal gland to make the puncture on the inner side where the intervening layer of tissue is thin and comparatively free from veins. During pregnancy the veins of the external genitals become enlarged and varicose and sometimes there is a spontaneous rupture of a vein subcutaneously, giving rise to a hematoma without external injury.

Symptoms and Diagnosis.—After some slight injury, a swelling is noticed, which increases rapidly in size and is accompanied by considerable pain, especially when the patient is standing. If large, the swelling distorts the parts very much, in some cases so much that the individual structures are identified with difficulty. The swelling presents induration and, if a large collection of blood has formed, there may be fluctuation.

The swelling and pain and induration are much the same as in acute cellulitis and it may be mistaken for that affection, particularly if the hemorrhage is situated so deeply that the skin is not discolored. In one typical case, which the author saw in consultation, the physician was much alarmed, fearing that he had caused a serious infection. He had punctured a small cyst with a hypodermic syringe and drawn off the fluid. Within twenty-four hours a large swelling gradually formed accompanied by much pain and distending and distorting the genitals on that side. In the next twenty-four hours the swelling seemed to get worse instead of better. He decided it would be necessary to make deep incisions to stop the serious spreading infection. The findings on examination together with the history, showed that the trouble was a hematoma following the hypodermic-needle puncture. Rest with the hips elevated and an icebag applied locally was the treatment adopted, with satisfactory result.

The differential diagnostic points between hematoma and cellulitis are that the hematoma begins to develop within a few hours after the injury, too soon for infection to develop, and that there is little or no fever and that the tenderness on superficial palpation and the local heat are neither so marked as in acute inflammation. In a few days the extravasated blood finds its way too near the surface and colors the skin and confirms the diagnosis.

Treatment.—Put the patient to bed and elevate the hips by placing a pillow under them, at the same time arranging a pillow under the knees so that the patient will be comfortable, and apply an ice bag over the swelling. The patient should be kept perfectly quiet in this position until the hemorrhage ceases—several hours if necessary. If there is much pain, sedatives should be given to keep the patient quiet. The cessation of the hemorrhage is indicated by the swelling ceasing to increase in size and by diminution in the pain.

If the hematoma is very large and increasing in size, it is advisable to incise the swelling, under antiseptic precautions, turn out the clots, ligate the bleeding vessel or vessels, cleanse the cavity, and obliterate it with sutures. This avoids sloughing of the skin, suppuration of the blood collection and dangerous septicemia. In the later treatment of a case in which the incision has not been necessary, the patient must be kept in bed until absorption is well under way. If suppuration takes place in the collection of blood the resulting abscess must be opened.

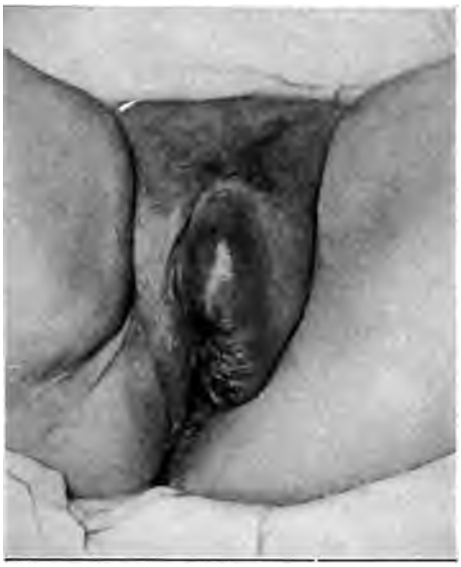


Fig. 348.—Hematoma of the vulva. (Hirst—*Diseases of Women.*)

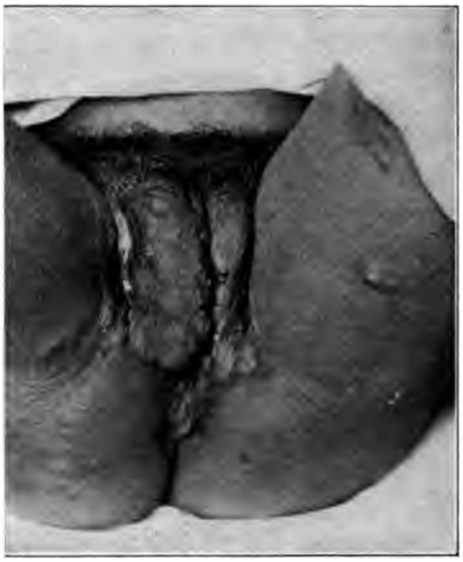


Fig. 349.—Varicose veins of the vulva. (Hirst—*Diseases of Women.*)

A large hematoma, especially if occurring in labor or advanced pregnancy, is a serious matter. The swelling may burst and fatal external hemorrhage occur or the patient may bleed to death without external opening, the blood simply burrowing in the loose subcutaneous tissues. Such a serious result is rare, but the fact that it may occur must be kept in mind and, if the hemorrhage persists in spite of the ordinary measures, the affection should be treated by operation before the patient is too weak. After the blood clots are turned out, an attempt should be made to catch the bleeding vessels with forceps. If the particular vessel that is bleeding cannot be located, catch the bleeding tissues rapidly with forceps until the hemorrhage is stopped and then ligate the bleeding areas *en masse* or include them in sutures.

It has been recommended in these cases to stop the hemorrhage by firm packing, but valuable time may be lost in placing a packing which, after all, may fail to stop the bleeding. The safer plan in severe cases is to catch the bleeding vessels and ligate them, so that there is no chance for further loss of blood.

VARICOSE VEINS OF VULVA

The veins about the external genitals may become markedly varicose, the irregular dilatation being due to some obstruction to the pelvic circulation, such as pregnancy or a pelvic tumor. The dilatation of the veins only rarely gives rise to troublesome symptoms. Sometimes the patient complains of itching or of tension in the parts. Sometimes she becomes alarmed on account of the enlargement and consults the physician simply to know the cause. Occasionally, however, there may be marked enlargement (Fig. 349), with aching in the parts and much irritation of the skin. The danger in these cases is that a severe hemorrhage may take place, or a large hematoma form from slight injury or from spontaneous rupture of a varicose vein.

Treatment.—Usually no treatment is required beyond directing the patient to keep the bowels well open and to avoid lifting or straining as much as possible. Anything that increases the intrapelvic pressure or interferes with the pelvic circulation tends to increase the venous dilatation. In advanced pregnancy, an abdominal supporter takes some of the weight of the uterus from the anterior part of the pelvis and in that way may improve the circulation there. If the dilatation is sufficient to give the patient trouble, some relief may be afforded by a pad and T-bandage, so applied as to support the veins and prevent further dilatation. The patient should take the recumbent posture several times daily, and in some cases it may be advisable to keep her in bed continuously in the later weeks of pregnancy.

If there should be subcutaneous rupture of a vein, employ the treatment given under hematoma.

If there should be external rupture, employ the treatment given below for open hemorrhage following injury.

When in the nonpregnant, the veins are so much enlarged that they are troublesome, they may be excised. They are exposed by an incision through skin covering them, the bunch of veins isolated and ligated at each end and excised and the stumps brought together and the incision closed by sutures.

INJURIES OF EXTERNAL GENITALS

The genitals are in such a well-protected situation that injuries are rare. Such injuries as do occur, apart from labor, are due usually to a fall astride some object or to kicks and blows intentionally inflicted or to injuries from coitus (Figs. 350, 351, 352).

Injuries in this locality should be treated on the same general principles that govern the treatment of injuries in other localities, viz., stop hemorrhage, secure asepsis as far as possible, approximate divided tissues sufficiently to restore function and afterward protect the wound with a suitable dressing.

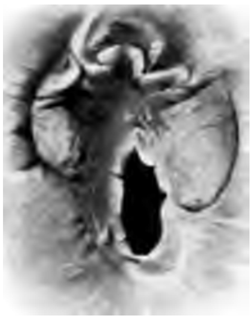


Fig. 350.—Laceration about vaginal opening from rape in a girl aged twelve. There were also injuries higher and the child died in ten days of peritonitis. (Edgar—*Practice of Obstetrics.*)

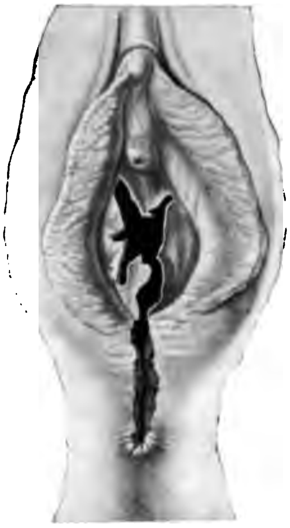


Fig. 351.—Complete laceration of the pelvic floor in an infant of eight months, from rape. (Edgar—*Practice of Obstetrics.*)

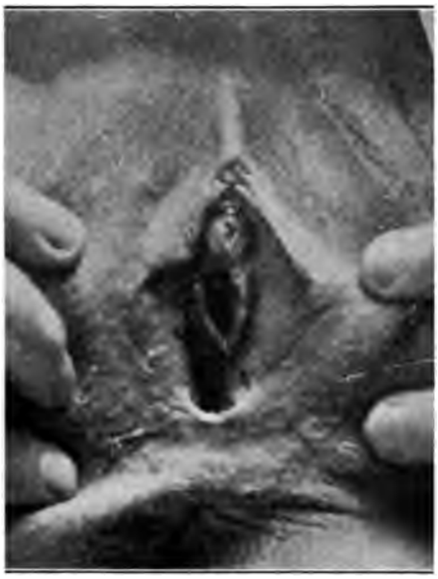


Fig. 352.—Laceration of perineum with resulting fistula, from violent coitus. (Hirst—*Diseases of Women.*)

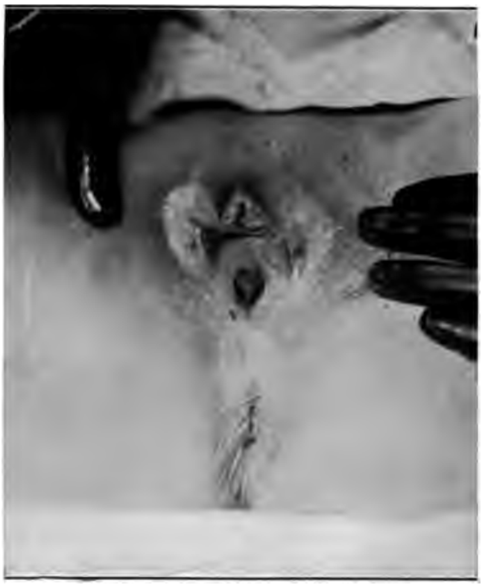


Fig. 353.—Kraurosis vulvae. (Hirst—*Diseases of Women.*)

There are two special characteristics of injuries in this locality that must be kept in mind.

1. **Free Hemorrhage.**—The parts are very rich in blood vessels, particularly veins, and slight injury may cause severe bleeding, either as external hemorrhage from an open wound or as subcutaneous hemorrhage from a bruise, giving rise to a hematoma.

An instance of troublesome hemorrhage from a slight injury is the persistent bleeding that occasionally follows the small tear of the hymen in the first coitus. On account of modesty and embarrassment, the newly married couple hesitate to call in assistance, and sometimes the bleeding persists for hours—until they do finally call a physician, who may find the bedding soaked with blood and the bride almost exsanguinated.

OPEN HEMORRHAGE from injury to genitals should be stopped by packing or by sutures or by forceps or by ligature of separate vessels or by ligature of the bleeding tissue *en masse* as indicated by the nature of the wound. After treatment of the wound, the patient should be kept in bed with hips elevated until all tendency to hemorrhage is past. In attempting to stop hemorrhage, either from a wound or during an operation, if the bleeding vessels cannot be made out and the bleeding is free, the most satisfactory plan is to pass one or more sutures through the bleeding area and tie them.

In case of injury about the venous masses called the bulbs of the vestibule, the hemorrhage, whether open or subcutaneous, may often be controlled by packing the vagina firmly and then putting a firm compress over the vulva, such as a folded towel held in place by a strong T-bandage making firm pressure.

In open hemorrhage from a small wound, if the pressure does not control it, the wound may be packed with pledgets of cotton dipped in liquor ferri subsulphatis or in tannic acid powder, and then the vaginal packing and vulvar compress employed.

In SUBCUTANEOUS HEMORRHAGE (hematoma) the patient should receive the treatment described elsewhere for that affection.

2. **Marked Swelling.**—In this locality the subcutaneous tissues are loose and decided swelling is liable to follow an injury, either immediately from subcutaneous hemorrhage or serous effusion or later from inflammatory exudate.

To prevent the swelling, or diminish it if present, put the patient to bed, elevate the hips and apply an ice bag over the parts. If the swelling is from inflammation, hot applications may give more relief than the cold.

For further treatment of vulvar swelling see hematoma and also cellulitis of vulva.

KRAUROSIS VULVAE

Kraurosis vulva is a term applied to a rather rare affection of the external genitals characterized by atrophy and shrinking of the skin and obliteration of the normal folds, and a change in the consistency of the epidermis by which it becomes somewhat like scar-tissue. It is known also as "atrophy of the vulva," as "progressive cutaneous atrophy," and as "leucoplatic vulvitis."

The essential cause is not known. It has, in various cases, been preceded by eczema and other chronic inflammatory diseases of the vulva, by pruritus vulvae, giving rise to much scratching and irritation and excoriation, by removal of the uterine appendages and by chronic vaginal discharge. It has, to some extent, been attributed to each of these conditions, but apparently none of them constitute the essential factor in its development.

Age seems to be a definite factor in the etiology, for it occurs almost exclusively in women near or past the menopause. This would seem to indicate that it is in some way connected with senile atrophic changes. As cutaneous atrophy is such a marked feature of the affection, it has been surmised that it is due to an atrophic affection of the nerves of the parts, and marked changes in the nerves have been demonstrated. But whether such changes are primary or secondary is somewhat uncertain.

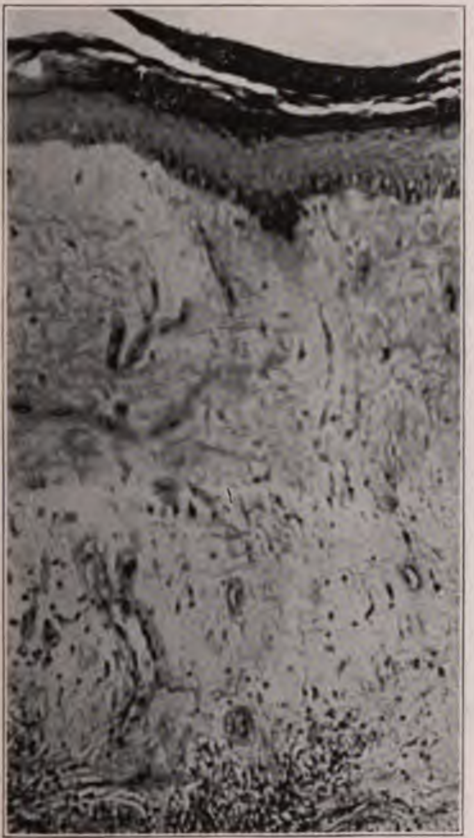


Fig. 354.—Kraurosis vulvae, advanced, showing the marked atrophic change in the epithelium and underlying tissues. Weigert-Van Gieson stain showing the absence of elastic fibers. Gyn. Lab.

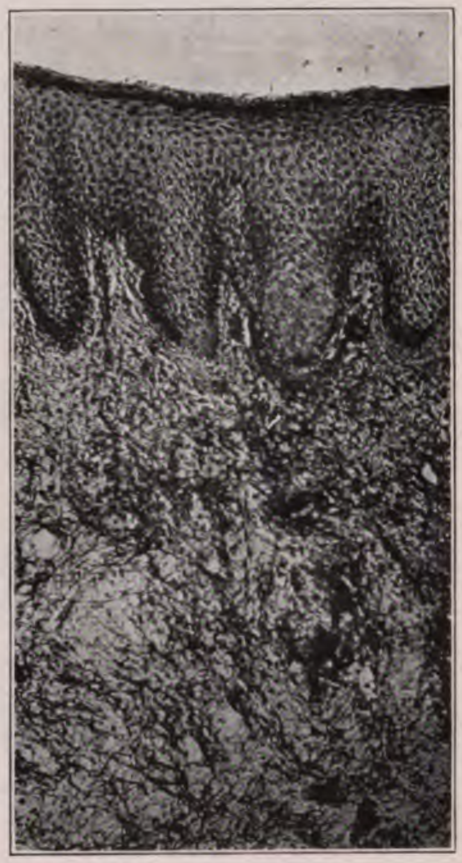


Fig. 355.—Normal vulvar tissue showing normal epithelial layers and subepithelial tissue. Weigert-Van Gieson stain showing normal quantity of elastic fibers, which stand out black with this stain. Gyn. Lab.

Pathology and Symptoms.—In the beginning there is a low-grade inflammatory process, which appears in spots just outside the vaginal opening or on the labia. The spots are hyperemic (reddened) and may be slightly swollen but are usually depressed. In the beginning, hypertrophic areas are sometimes noticed. The spots are painful on pressure and for that reason sexual intercourse, or even the introduction of a douche nozzle, may be very painful. As the disease progresses, the older portions lose their color and elasticity. The hyperemia disappears and, instead, the tissue becomes white and dry and brittle and cracks easily (Figs. 353, 289, 290).

Another marked characteristic is the tendency to shrink. The atrophic contraction may progress to such an extent that the vaginal opening is much narrowed. Microscopic examination of the excised tissue shows that the process is a trophic change characterized by chronic inflammatory areas and thickening of the overlying epithelium (Fig. 391), but especially by a gradual disappearance of the elastic tissue (Figs. 354, 355). This is supposed to be due to some disturbance of the trophic nerves to the parts.

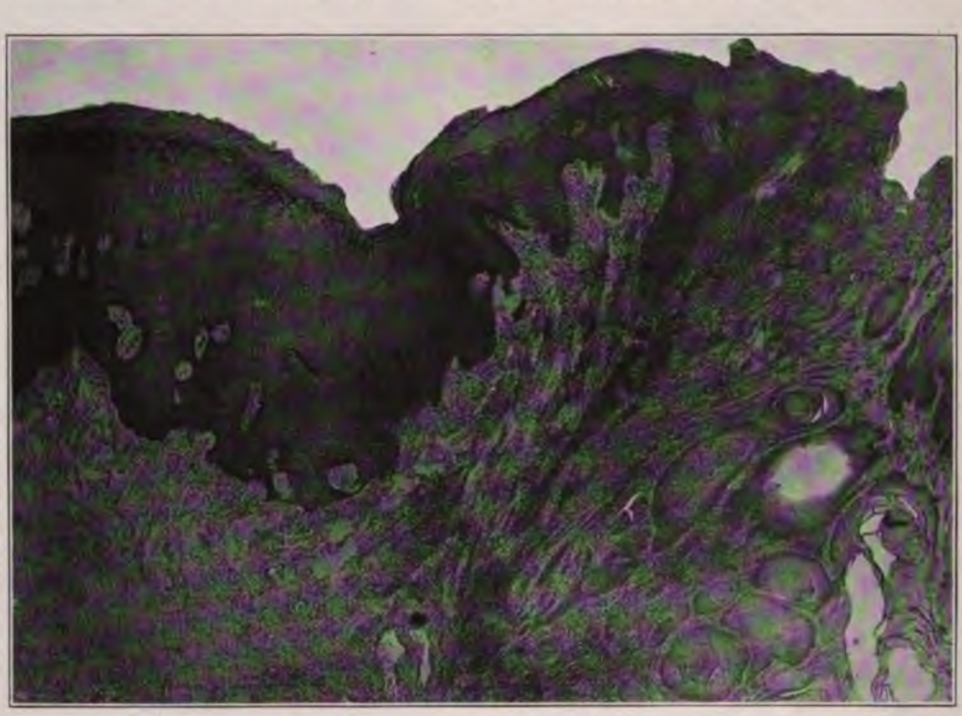


Fig. 356.—Kraurosis vulvae with beginning carcinoma. The kraurosis is in the stage of epithelial hypertrophy which precedes the marked atrophy shown in Fig. 354. This is an excellent example of a squamous carcinoma beginning on a kraurotic base. Gyn. Lab.

In the earlier stages there is serous and cellular exudate, with hyperemia and occasionally slight hemorrhage. In this stage there may be decided thickening of the affected spots. Later, the cellular exudate becomes organized, with resulting contraction and hardening and atrophy. The glandular structures (sweat glands, sebaceous glands and hair follicles) are slowly obliterated by pressure-atrophy, and there is left simply atrophic decolorized inelastic tissue.

The pathologic changes just described are usually accompanied by burning and itching and tenderness. Owing to the sensitive spots and the narrowing of the vaginal orifice, coitus may be painful or impossible. Owing to the brittleness of the tissues, the examination may cause fissures, which add to the patient's discomfort. This affection is one of the causes of persistent and severe pruritus vulvae.

In some cases, but little discomfort seems to result from the pathologic changes. The disease is gradually progressive for a number of years but is not self-limited and spontaneous cure cannot be promised, though in the areas in which the skin structures are practically destroyed, the pain and itching may be much diminished.

Treatment.—Temporary relief may be afforded by the measures given under Pruritus Vulvae. One case was much benefited, in fact temporarily cured, by the use of the sharp curet followed by the long continued application of a 3 per cent solution of salicylic acid in alcohol.

One writer recommends that an ointment containing one to three per cent of yellow oxide of mercury, be rubbed well into the parts by the patient twice daily, and that twice weekly the physician introduce the speculum, cleanse the vulva and vagina with a spray of hydrogen peroxide and then apply the above ointment to all the affected surfaces.

In these cases, the x-ray treatment, administered by a competent person, sometimes gives great relief after other measures have failed, and if continued may effect a cure.

The justifiable assumption that the atrophic changes in the vulvar skin are the result of cessation of ovarian function of late has led to the use of ovarian extracts in the treatment of kraurosis. The results are uncertain, but most satisfactory, at least in some cases (see Chapter XV).

Relief in many cases may be afforded by extirpation of the involved tissue, and this operation should be carried out when the symptoms are severe and not relieved by other measures. Excision of the affected tissue should not, however, be carried out until the disease has existed some time and its probable limits can be defined. If in the early stage the parts then affected are excised, there is strong probability of the development of the same process in remaining tissues, necessitating a second operation. When an operation is decided upon, the incision should include all the superficial areas involved and should be deep enough to include part of the subcutaneous tissue. The resulting wound should be closed as far as possible by sutures. When the margins of the wound cannot be brought together, the uncovered portion, if small, may be left to granulate. If the uncovered portion is large, immediate skin grafting may be done at the time of the operation.

The results of extirpation are encouraging. Decided relief is afforded and in some cases there is a complete cure. Some of the skin surface, unaffected at the time of the operation, may show evidences of the disease later, with symptoms requiring treatment. If the symptoms are severe and persistent, those portions of skin may also be excised. This may not, however, be necessary and other methods for relieving the pruritus should be given a thorough trial.

The chronic irritation and cellular changes of kraurosis vulvae probably constitute an important factor in the development of cancer of the vulva. This fact has already been mentioned and illustrative cases cited under malignant disease of the vulva. Fig. 356 shows a carcinoma developing on a kraurotic base.

PRURITUS VULVAE

Pruritus vulvae signifies simply itching about the external genitals, but by common usage the term has come to be restricted to those cases in which the itching and burning is marked and persistent.

Etiology and Pathology.—The general nervous disturbances and the local atrophic changes that accompany and follow the menopause, predispose to pruritus vulvae, hence the vast majority of cases are found in that period of life.

The following are the exciting causes.

1. AN IRRITATING VAGINAL DISCHARGE.—The discharge may originate in the vagina or in the uterus. Adhesive vaginitis, which occurs principally in the aged, is a frequent cause of pruritus vulvae. Sometimes a discharge which is so slight as not to be noticed by the patient, will keep up a troublesome pruritus, the pruritus disappearing temporarily when the discharge is kept from irritating the external genitals by the administration of douches or by a tampon against the cervix.

2. IRRITATING URINE, for example diabetic urine, highly acid urine and pus-bearing urine due to inflammation of the bladder or kidney.

3. PARASITIC AFFECTIONS, of which the most common in this region is pediculosis pubis. In children threadworms from the rectum may cause persistent itching.

4. SKIN DISEASES, such as eczema, follicular inflammation and prurigo.

5. LACK OF CLEANLINESS.

6. Growth of SHORT BRISTLY HAIRS on the inner surface of the labia. These scratch and irritate the adjacent surface and sometimes cause very troublesome pruritus. Occasionally such irritation is caused by the short hairs present for some weeks after shaving the parts for an operation.

7. FRICTION from exercise, especially in very stout persons.

8. KRAUROSIS VULVAE, or as it is sometimes called "local nerve fibrosis." J. C. Webster carefully studied the microscopic characteristics of excised tissue in several cases of pruritus vulvae, and found a progressive nerve fibrosis, affecting principally the nerves of the clitoris and labia minora. It affected both the nerves proper and the nerve endings. It was apparently distinct from the cellular infiltration of the subepithelial tissues caused by scratching.

9. CHRONIC CONGESTION, from diseases of the uterus or tubes or ovaries or other pelvic structures.

10. FUNCTIONAL NERVOUS DISTURBANCES.—In some cases, no cause for the disturbance can be found and apparently no local changes are present, aside from the abrasions and irritation caused by the scratching. Under such circumstances the disease is classed as a "neurosis."

In some cases the gouty diathesis is apparently responsible for the trouble. The presence in the blood of urea, sugar, bile, or other products of faulty metabolism have a general irritating effect on the vulvar and vaginal surfaces. Alcoholic drinks, rich foods and, in certain persons, fish or shellfish, may assist in causing the disease.

Symptoms.—The patient complains of an intense itching about the genitals. It may be confined to the clitoris, labia or vestibule, or it may involve all these structures and also adjacent regions, for example, the vagina, anus and inner sides of the thighs. The itching and burning may be practically continuous, but more often it is intermittent in character. It may disappear spontaneously for several hours or days or even longer, only to return as suddenly as it disappeared. Congestion at the menstrual period or during pregnancy increases the pruritus. Irritating articles of food and also alcoholics often have the same effect. The warmth of the bed usually makes the itching worse, consequently the patient may lose much sleep. During sexual intercourse the itching and burning are much increased.

Frequently the distressing symptoms persist in spite of local and general sedatives and in some cases they become intolerable, making the patient's life a burden to her. On account of the irresistible tendency to scratch or rub the parts, the skin becomes irritated and abraded and inflamed. Deep fissures may form and in some cases a discharging or weeping surface develops. The constant suffering makes the patient irritable and nervous and in some cases leads eventually to nervous prostration.

Treatment.—The treatment for pruritus vulvae may be presented in the following steps:

1. Remove All Local Causes of Irritation.—These have been enumerated under etiology. If an irritating vaginal discharge is present it must be stopped by appropriate treatment of the disease causing it. If that is not possible, the discharge may be kept from irritating the genitals by washing it away with antiseptic douches. Sometimes it is advisable, after the douche, to introduce a tampon which prevents the discharge from coming in contact with the external genitals. The tampon is removed at the next douche time. The tampon may be used dry or it may be saturated with borax and glycerin (1 to 4) or with acetate of lead and glycerin (1 to 4) or with ichthyol-glycerin (10 per cent to 25 per cent). The importance of vaginal discharge as a causative factor in pruritus is not so great as might at first be supposed. In fact, it is very doubtful whether ordinary leucorrheal discharge alone ever causes severe pruritus. In each case there is probably some other more important factor. In a case of pruritus presenting a vaginal discharge, the discharge has some effect in keeping up the local irritation and consequently should be stopped. But there is no certainty that the pruritus will cease when the discharge is stopped, hence caution in prognosis is necessary. Other causes of local irritation, such as diabetes, local skin diseases, and uterine or ovarian disease causing pelvic congestion, must receive appropriate treatment.

2. ATTEND TO THE GENERAL HEALTH.—Regulate the bowels so that the accompanying pelvic congestion is diminished. Also, put the patient in the best general health, that the condition of the nervous system may be improved accordingly. General sedatives, for example, bromides, valerian, hyoscyamus, may diminish the itching by their effect on the nervous system. The antineuralgic remedies (phenacetin, antipyrin), may give temporary relief.

Defective elimination, neurasthenia, gastrointestinal disturbance and other diseases present must receive appropriate treatment. The diet must be looked after sufficiently to exclude alcoholics and other articles that tend to prolong skin irritation. In some cases it may be necessary to make a complete change of climate and surroundings, in order to satisfactorily affect the patient's nervous system or some existing diathesis.

3. EMPLOY LOCAL SEDATIVE APPLICATIONS to relieve the inflammation and check the local nerve irritation. The various applications recommended under vulvitis and vulvar eczema may be tried. The silver preparations (argyrol, protargol, silver nitrate) are particularly effective when there is active superficial inflammation. The silver preparation applied over the affected area once or twice weekly with the aluminum acetate douche once or twice daily and the free use of a dusting powder, may be sufficient to correct the trouble. If a stronger antipruritic preparation is necessary the following, used by Engman and Mook for pruritus in skin irritation generally, may be very helpful: Phenol 2 parts, liquor carbon detergens 3, calamine 2, zinc oxide 2, glycerin 7, and rose water to make 100. This mixture, well shaken, is to be applied over the affected areas and then the dusting powder used freely. Generally the more dry the parts can be kept and free from vaginal discharge or perspiration, the less the irritation. Hence, the frequent and liberal use of the dusting powder. However, some patients obtain more relief from the use of carbolized vaseline or other bland ointment and the dusting powder over that.

4. X-RAY TREATMENT.—If the intolerable itching persists in spite of the measures mentioned, then x-ray treatment of the affected areas is advisable. This has given great relief in some of these cases, even in the very severe cases with marked kraurotic changes. If the area involved is very limited, radium treatment may be used.

5. OPERATIONS.—In certain intractable cases, particularly those accompanied by evidences of kraurosis vulvae, relief was afforded by excision of the involved tissues as previously described, after the other measures had failed. When incision is resorted to, it is as a rule necessary to remove the labia minora and the clitoris with its prepuce, and often the inner portions of the labia majora.

Another operative measure which has brought about recovery in some cases, is resection of the internal pudic nerve. The nerve is reached by an anteroposterior incision midway between the tuberosity of the ischium and the anus. Care must be taken that the innervation of the rectum be not damaged, with resulting incontinence of feces.

HYPERESTHESIA OF THE VAGINAL ENTRANCE

The structures surrounding the vaginal orifice may be so hyperesthetic, that coitus is very painful and in some cases impossible. Occasionally the parts are so tender and the nervous irritability so marked that attempts at sexual intercourse cause a spasm of the muscles surrounding the vaginal opening, including the levator ani. This spasmodic condition is known as "vaginismus."

Causes.—Hyperesthesia of the vaginal entrance occurs most frequently in nervous young women, newly married, or in women near the menopause. The causes of this marked hypersensitiveness are as follows:

a. Urethral caruncle or inflammation about the meatus.

b. Painful fissures about the vaginal orifice or about the anus.

c. Inflammation of a rigid hymen or of remnants of a hymen.

d. Abnormal form of vulva by which the penis is directed in the wrong direction, particularly against the urethra, causing much pain.

e. Neuromata on remnants of the hymen.

f. Neuroses. In some cases, especially in women near the menopause, no local cause for the marked sensitivenesss can be discovered and it is apparently due to some functional disturbance of the nerves.

Treatment.—The treatment may be presented in the following steps:

1. Reduce the general nervous irritability by sedatives and relieve the pelvic congestion by laxatives.

2. Remove all local lesions that cause irritation. Abrasions, fissures and areas of inflammation must be made to heal. The various therapeutic measures for these conditions have been described. A rigid hymen must be treated by stretching or incision or excision.

Neuromata sometimes develop in remnants of the hymen about the posterior commissure, and occasionally in the tissues about the meatus or the clitoris. There may be one or more nodules, varying in size from the head of a pin to a bean. They are exceedingly sensitive when touched in the examination. They should be excised deeply and the small wound closed by one or two sutures if there is much bleeding. Ten to twenty drops of novocaine solution (½ per cent) injected under the nodule a few minutes before excision diminishes the pain. If the nodule can be easily raised it may be clipped off with the scissors. If it is imbedded in the tissues, it must be dissected out with a knife.

3. Employ local sedative applications and stretching. A hot lysol douche, once or twice daily, may diminish the sensitiveness of the parts. The various sedative measures mentioned under vulvitis and pruritus vulvae may be employed. The 10 per cent chloretone ointment may give much relief. A cocaine ointment (5 per cent) may be applied to the sensitive parts. The ointment applied freely, serves also to lubricate the parts and in that way helps to diminish the pain.

When this affection occurs in a young married woman, if the patient becomes pregnant and is delivered at term, the vaginismus will probably be heard of no more. Consequently, if by temporary measures the pain of sexual intercourse can be overcome for a few weeks, pregnancy may take place and a permanent cure follow.

In some mild cases the patient may be given relief or even cured by introducing a bivalve speculum every second or third day, and very slowly and carefully stretching the parts until decided discomfort is noticed. No severe pain should be caused, as the patient may be frightened and made worse.

4. Operative Treatment.—When the measures mentioned above do not give relief then it is advisable to divide the perineum through two-thirds or three-fourths of its extent (Fig. 924), loosen the upper mucosal flap and the lower skin flap from the underlying tissues and suture them together over the raw areas as indicated in Fig. 924. When good healing is secured, this operation permanently enlarges the vaginal opening so that the spasm does not close it completely. In some marked cases it may be advisable to extend the incision laterally on one or both sides so as to still further divide the spasmodic levator sling. If there are any particularly hyperesthetic areas on the skin, it is well to excise them in the course of the operation.

ADHESIONS OF PREPUCE

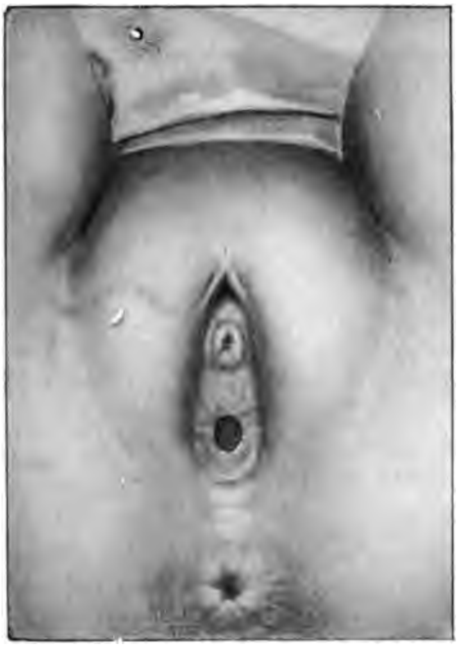


Fig. 357.—A case of adherent prepuce, the clitoris being entirely hidden. (Kelly—*Operative Gynecology*.

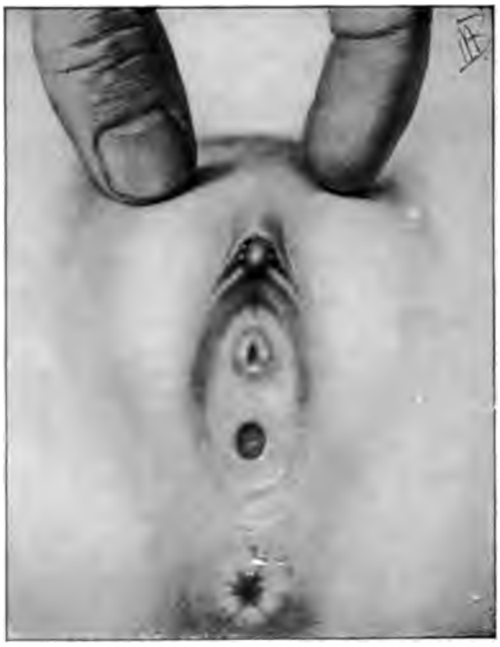


Fig. 358.—The same case, with the adhesions separated and the prepuce pushed back and the clitoris exposed. Notice the smegma concretions which had formed under the adherent prepuce. (Kelly — *Operative Gynecology*.)

Not infrequently in infants, adhesions are found between the glands of the clitoris and the prepuce. In some cases the adhesions are extensive (Figs. 386, 387) and much irritation is produced by retained secretion, not so rarely forming the underlying cause for the habit of masturbation innocently acquired by a child. In such a case the adhesions should be separated. A strong solution of cocaine (10 per cent to 20 per cent) is applied to the parts for five minutes, then with a blunt dissector, the adhesions are broken, the glans thoroughly exposed (Fig. 387) and the part cleansed and smeared with carbolized zinc ointment (2 per cent) or with carbolized vaseline (2 per cent). Every day or two the prepuce should be pushed back and the antiseptic ointment applied, until there is no further danger of the formation of new adhesions.

ADHESIONS OF LABIA

The labia minora are occasionally found adherent. This condition may be congenital or acquired. In the latter case, the cause is inflammation or ulceration of various kinds, producing raw surfaces which come in contact and grow together (Fig. 359). The adhesions are usually found in the unmarried, as the parts are not so frequently disturbed, and especially in children and in the aged, when considerable irritation may persist without attracting notice. The adhesions between the labia are easily broken if recent, but later the adherent surfaces become firmly united by connective tissue and can be separated only with a knife. The treatment, when the adhesions are recent and weak, is to break them with a probe or other blunt instrument, separate the labia and keep them apart with pledgets of cotton. Treat the affected surfaces as indicated by the inflammation or ulceration present. When the adhesions are old and firm, the parts may be separated with the knife or scissors, or the line of union, with some of the thickened tissue on each side, may be excised (Fig. 360). Sutures are then introduced to check the hemorrhage and close the raw surfaces. If there is a marked tendency of the vaginal orifice to contract from scar-tissue, it may be stretched at the same time, and a glass plug worn for a time afterward if necessary.

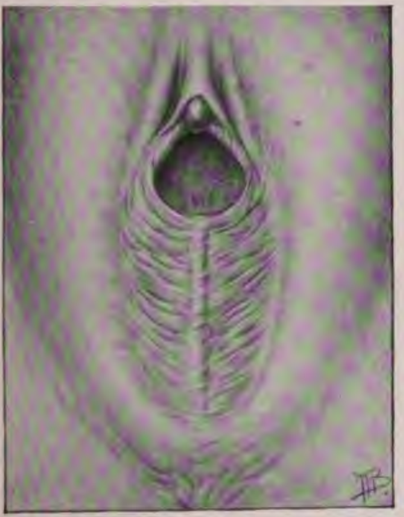


Fig. 359.—The labia minora adherent all along their free margins. (Kelly—*Operative Gynecology.*)

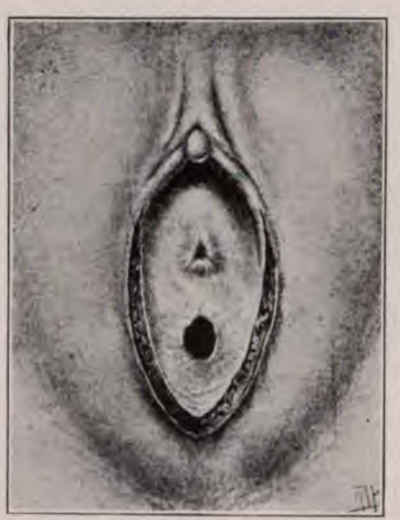


Fig. 360.—Excision of the adherent and deformed labia minora. (Kelly—*Operative Gynecology.*)

CHAPTER V

RELAXATION AND FISTULAE

of the Pelvic Floor, Perineum, External Genitals and Vagina

POINTS IN ANATOMY

The term "pelvic floor" is applied to that group of structures which closes in the pelvic outlet and supports the structures above it. The muscular and fascial layers are shown in Fig. 361. The important structures—those that give strength to the floor—are principally the levator ani muscles and the rectovesical fascia. There are, however, a number of other structures in this locality, and probably the best way to consider them systematically is to take them up in the order in which they are met with in the regular dissection of this region.

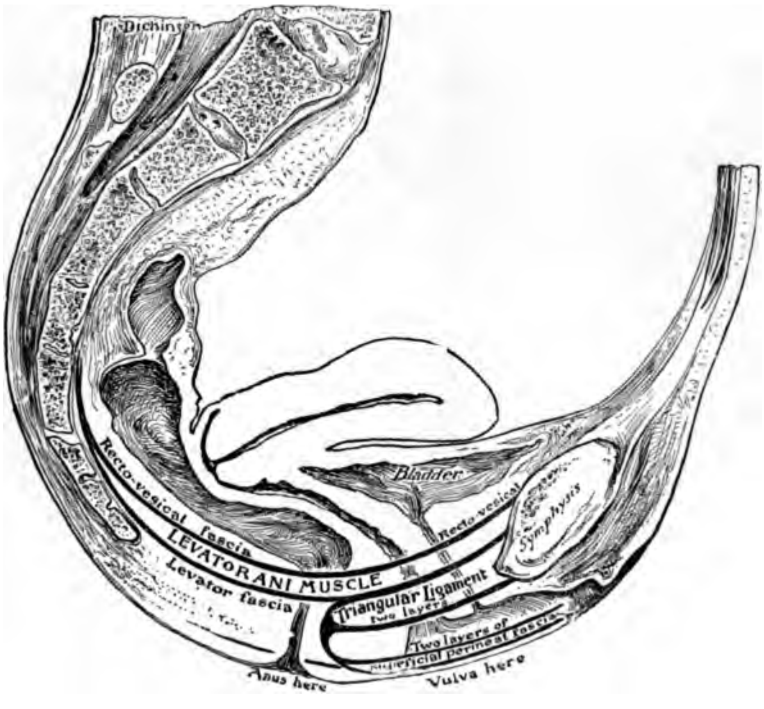


Fig. 361.—A diagrammatic representation of an anteroposterior section of the pelvis, showing the various fascial layers of the pelvic floor. (Dickinson—*American Textbook of Obstetrics.*)

Having the body in position for dissection of the perineum and making observation before the integument is removed, it is found that the area between the coccyx and the pubes is filled in as follows, beginning in front:

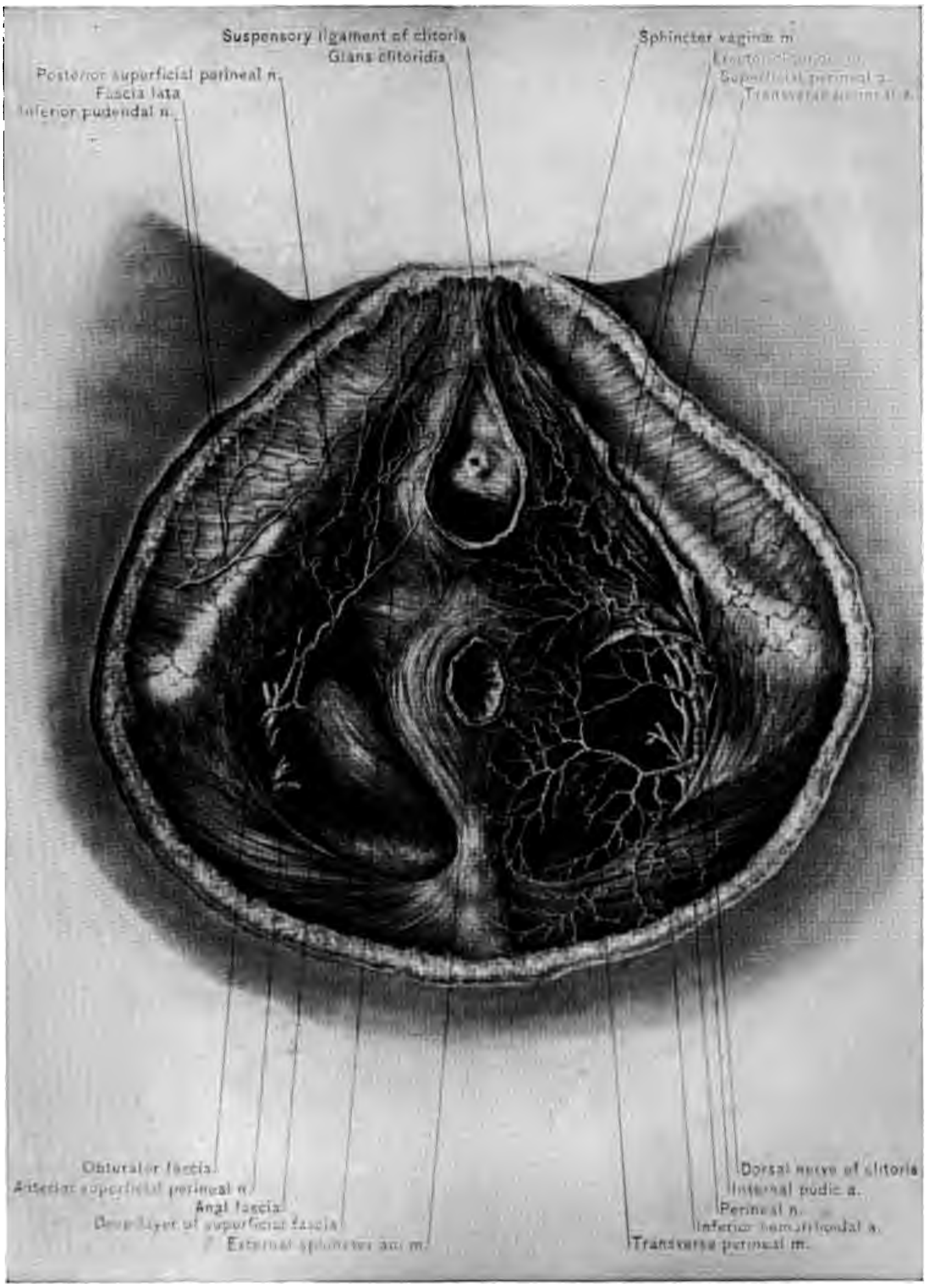


Fig. 362.—View of the superficial structures from below. Showing the sphincter ani muscle, the transversus perinei muscles and the arteries and nerves. (Deaver—*Surgical Anatomy.*)

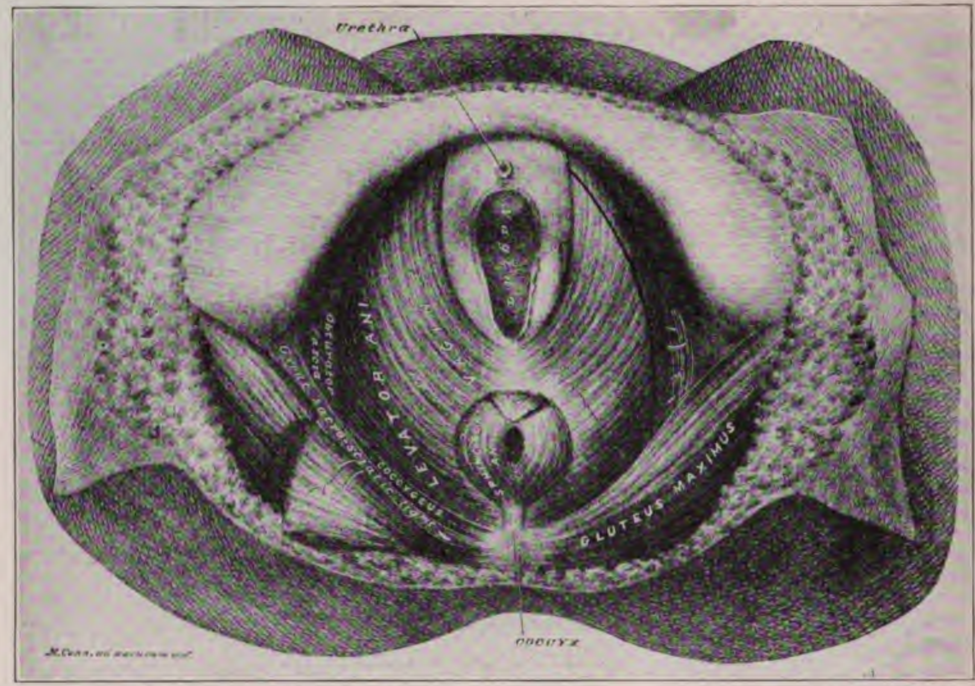


Fig. 363.—The superficial structures removed, exposing the levator ani and vaginae muscles. (Weisse—*Practical Human Anatomy.*)

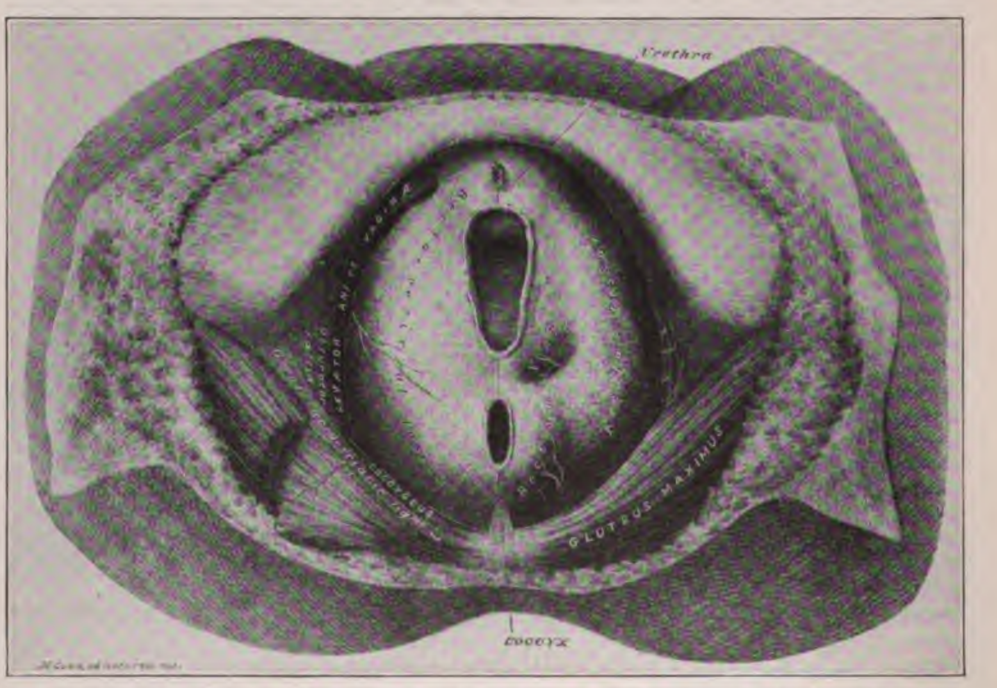


Fig. 364.—The levator ani muscles removed, exposing the strong rectovesical fascia. (Weisse—*Practical Human Anatomy.*)

The vulva or external genitals.
The perineum.
The anus and the ischiorectal fossa of each side (covered with integument).

The vulva and perineum occupy the anterior half of the space. The anus is situated at about the center, and around it to the sides and behind, are the ischiorectal fossae.

The **external genitals** have been described in Chapter IV. The **perineum** is the wedge of tissue situated between the vagina and the lower portion of the rectum. Seen in the anteroposterior section, it is roughly triangular Figs. 1, 3). In some cases it is somewhat quadrilateral. It separates the vaginal opening from the rectal opening, but does not form an essential part of the real supporting floor of the pelvis.

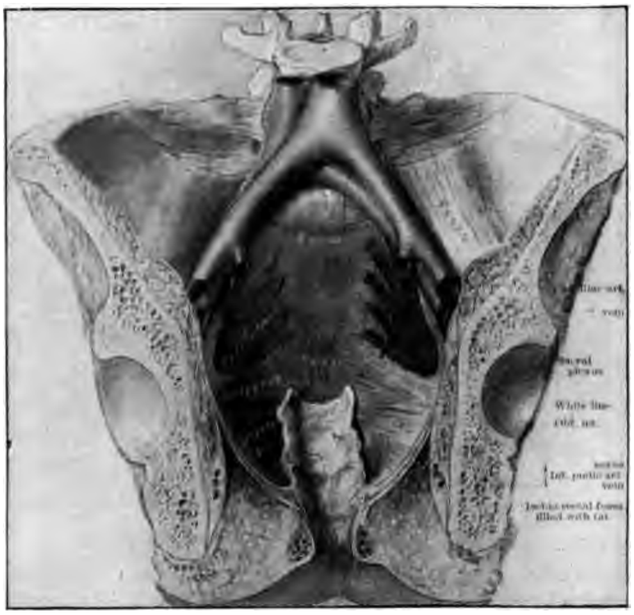


Fig. 365.—The pelvic sling. It is composed of the levator ani muscles and the fascia above and below them. Its attachment to the rectum is here shown but the vagina is not shown. (Kelly—*Operative Gynecology*.)

The removal of the skin and superficial fat and fascia, exposes the perineal fascia, the sphincter ani muscle and the ischiorectal fossa of each side. Each ischiorectal fossa is bordered behind and at the outer side by the gluteus maximus muscle.

Reflecting the perineal fascia there are exposed the sphincter vaginae and the transversus perinei muscles (Fig. 362). The transversus perinei muscle of each side is a small muscular band which arises from the ischial tuberosity and, extending inward, joins at the center of the perineum with the muscle of the opposite side and with the sphincter vaginae and with the sphincter ani muscles. When the perineum is torn, the action of all these muscles, particularly of the transverse muscles, is to draw the torn surfaces outward and keep them apart.

When all the superficial tissues, including the clitoris and the crura, are cleared away, then there is exposed the real pelvic floor—the supporting structures. These structures are the **levator ani muscles,** one on each side (Fig. 363) called also the levator ani and vaginae, and the fascia above and below them (Figs. 364, 365). The fascia under the muscle is thin and is called the "levator fascia," while the strong fascia above the muscle is called the "rectovesical" (Fig. 364). The levator ani muscles, arising from each side of the pelvis and joining in the median line, form a sling which holds up the vagina and rectum and at the same time holds their lower ends forward under the pubic arch.

Each levator ani muscle arises in front from the posterior surface of the pubic bone, behind from the spine of the ischium and between these points from the "white line" (Fig. 126) that marks the division of the pelvic fascia. The anterior portion of the muscle passes downward and toward the median line and unites with a corresponding portion of the muscle of the opposite side. Some of the fibers unite with the lower part of the vagina, some with the lower part of the rectum, some between the vagina and rectum and many of them back of the rectum. The most posterior fibers of the muscle unite with the coccyx. Lying back of the posterior part of the levator ani muscle is the coccygeus muscle. The action of the levator muscles, in conjunction with the fascia above and below them, is to hold forward the lower end of the rectum and vagina close to the symphysis pubis, and at the same time to form a sling which closes the pelvic outlet and supports the organs above (Figs. 363, 364, 366, 367). Waldeyer has given this the very appropriate designation of "diaphragm of the pelvis."

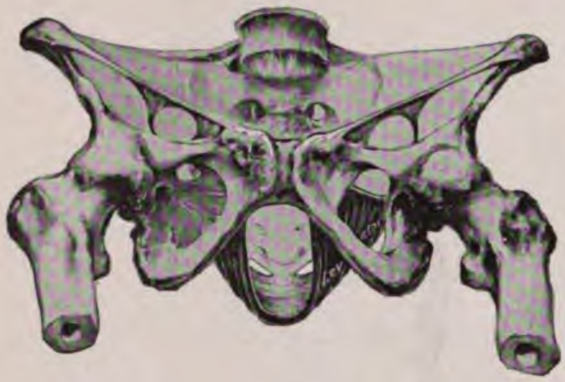


Fig. 366.—The pelvic sling, formed by the levator ani muscles. (Dickinson—*American Textbook of Obstetrics.*)

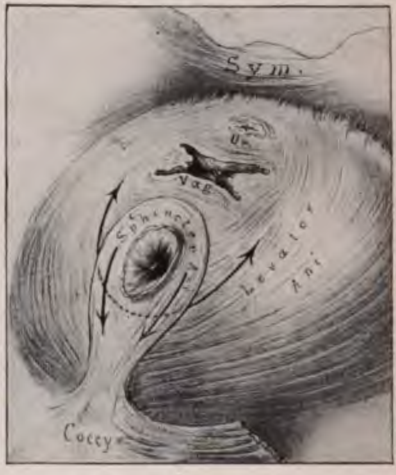


Fig. 367.—Actions of the pelvic sling. It tends to draw the vaginal opening and the anus forward under the pubic arch, at the same time that it supports them. (Kelly—*Operative Gynecology.*)

When the muscles and fasciae are torn, the effect is two-fold:

1. The sling is lengthened and does not furnish the support it previously did.

2. The vaginal and rectal openings (the weak places in the pelvic floor) are allowed to sink backward into the line of pressure, so that the weight from above, which formerly fell on the muscle and fascia, now falls on the openings.

In repairing the pelvic floor, the following two things must be accomplished:

1. The pelvic sling must be shortened, so that the slack is taken up.

2. The vaginal opening must be brought forward under the pubic arch, out of the line of direct pressure.

RELAXATION OF THE PELVIC FLOOR

For this common gynecologic condition, so frequently requiring operation, the author prefers the term "relaxation" rather than "laceration," for the following reasons:

a. It is the presence or absence of relaxation that determines the necessity for treatment. Even though there is immediate repair and perfect healing of the laceration there may, through subinvolution and lack of tone, be persisting relaxation requiring operation. Again, with an unrepaired laceration, the contraction of scar-tissue and regaining of tone may be sufficient to give good support, and there is no relaxation—hence, no cause for operation. The essential lesion, then, considered from the therapeutic standpoint, is the relaxation.

b. The term "laceration" as commonly used, and as interpreted by the patient, often works an injustice to the physician who took care of the patient during confinement. In a considerable proportion of cases the patient comes to the gynecologist with her mind poisoned against her former physician because some other physician has told her, bluntly and without qualification, that her present trouble is due to having been "torn in labor." The average patient interprets this as conclusive evidence of faulty care. In fact, she not infrequently begins her story with the statement that her trouble is due to neglect in confinement—this she knows because of having been informed that she was suffering from "a laceration."

Now, as a matter of fact, this wholesale condemnation is not warranted. Of course, in some cases the relaxation, for which the patient seeks relief, is really due to the fact that an extensive tear was not repaired at all or was repaired in a faulty manner. However, in a considerable proportion of the cases, the relaxation is due to entirely different causes. There may have been no open laceration, the overstretching having been accomplished by submucous lacerations (many or few) which could not even be located, much less repaired. Again, if pelvic floor involution is imperfect, as it often is in atonic patients, marked relaxation may result without there having been any definite lacerations, either open or submucous. This form of relaxation is especially apt to occur if the patient has repeated pregnancies at short intervals. Again, in certain cases, laceration or division of tissue must necessarily accompany delivery of the child. The wounds may fail to heal satisfactorily in spite of the utmost care. Again, a pelvic floor which is good two months after labor may be found greatly relaxed later, owing to displacement of the uterus or to heavy lifting (as of a heavy child) or to persistent straining or coughing associated with an atonic condition of the tissues. These facts are well known to every physician who has made a real study of the anatomy of the pelvis and of the physiology and pathology of parturition.

In view of the above facts, it is incumbent upon us to employ some term, for the condition under consideration, which does not in itself carry condemnation to the mind of the patient. "Relaxation" is such a term. It simply designates clearly the condition demanding relief, leaving open the question as to which one of the above mentioned causes may have been present in that particular case.

Etiology

The usual cause of laceration of the pelvic floor and perineum is **childbirth.** As the child's head passes through the pelvic outlet, the structures are greatly stretched and, if it is the first baby, there is frequently more or less laceration. In many cases the laceration is so slight as to be hardly noticeable. In some cases it is moderate and will cause trouble later if not repaired. In a few cases it is very severe, extending deeply into the sides of the pelvis or into the rectum or into both regions.

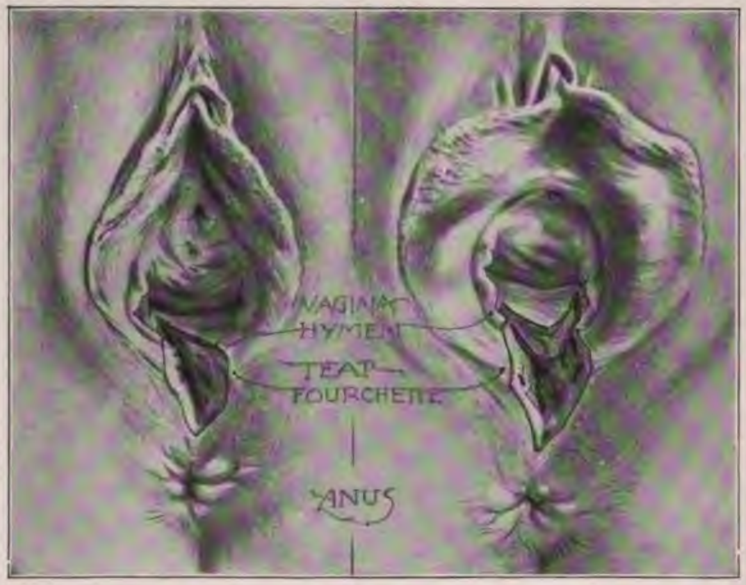


Fig. 368.—Recent lacerations in labor. *A.* Laceration involving the perineum and extending up the right vaginal sulcus. *B.* More severe laceration, involving the perineum and extending up both vaginal sulci. (Dickinson—*American Textbook of Obstetrics.*)

Pathology and Diagnosis

To understand the pathology of this affection, certain points in anatomy must be kept in mind. The real pelvic floor, that is, the part that supports the organs above, is formed by the two levator ani muscles with the layer of fascia immediately above and below (Figs. 361, 363, 364, 366). The recto-vesical fascia is a strong fibrous layer, probably the strongest and most resistant single element in the pelvic floor. It evidently is the structure which furnishes continuous support to the organs above, for the muscles of the floor cannot be constantly tense.

The perineum takes little part in the formation of the pelvic floor, as it lies below and outside of the supporting sling. The perineum may be torn with practically no damage to the pelvic floor, provided the anterior part of the levator ani muscles or adjacent fasciae are not involved in the tear. It is not the tearing of the perineum that destroys the integrity of the pelvic floor, but the tearing and stretching of the musculo-fibrous sling which passes back of the rectum and holds both the rectum and vagina well up under the symphysis (Fig. 367).

The pathologic changes and the diagnostic points are best considered together under the different varieties of laceration. Immediately after the delivery of the child and placenta, search should be made for tears of the perineum and pelvic floor.

Varieties of Laceration

There are several varieties of laceration, differing in extent and location.

1. There may be a slight tear of the perineum only, involving less than half of the perineum. The fourchette is torn and also part of the skin covering the perineum and also the lower portion of the posterior vaginal wall. Such a tear has practically no effect on the pelvic floor, as the pelvic floor proper is not involved. It is called a laceration of the perineum of the "first degree."

2. There may be a tear down past the middle of the perineum—laceration of "second degree." This may involve the perineum only, in which case there is no decided damage to the pelvic floor. Usually, however, the tear extends up the vaginal sulcus of one or both sides and involves the front part of the levator ani muscle and recto-vesical fascia (Figs. 368, 369). The lacerations involving the muscular and fibrous structures at the sides of the vagina are sometimes spoken of as "lateral" or "transverse" lacerations. The lacerations of the muscle and fascia may be open, communicating with a vaginal tear, or subcutaneous, with no vaginal tear in the immediate vicinity. By washing the blood out of the vagina with a hot douche and exploring with the finger, the tear in the vaginal wall may be felt and traced to its full extent. When its extent cannot be satisfactorily made out with the fingers alone, the vagina may be held open with retractors and the length of the tear ascertained by inspection. The tear may, in exceptional cases, extend around the sphincter ani, on one or both sides, without extending through that muscle into the rectum.

3. There may be a tear of the perineum through the sphincter ani muscle into the rectum—laceration of the "third degree" (Fig. 378). This, of course, occurs only in exceptional cases and is usually accompanied by one or more deep tears of the pelvic floor.

4. The perineum may be torn only slightly externally, while there is a deep tear inside involving the vaginal wall and the deeper structures. Such a tear may be overlooked unless careful exploration is made after labor.

5. The vaginal wall and perineum may be torn, the rim of the vaginal orifice remaining intact. This is known as central rupture of the perineum. It is very unusual.

The five varieties of laceration just given are easily recognized at the close of labor and should be repaired at once.

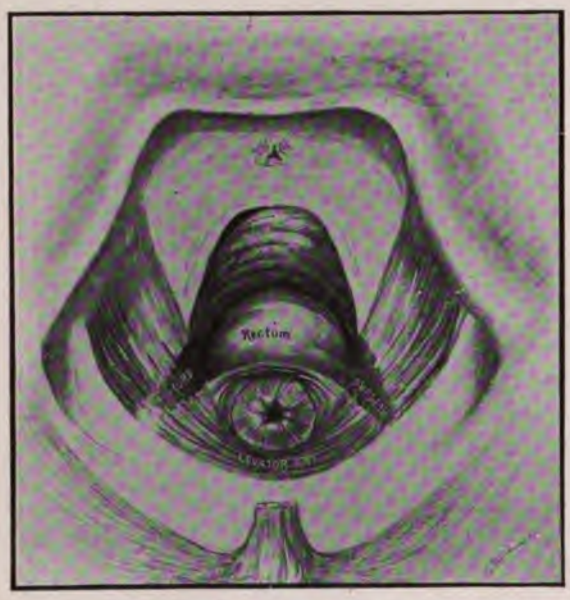


Fig. 369.—A deep laceration, extending up each vaginal sulcus and involving the pelvic sling on each side. (Gilliam—*Practical Gynecology*.)

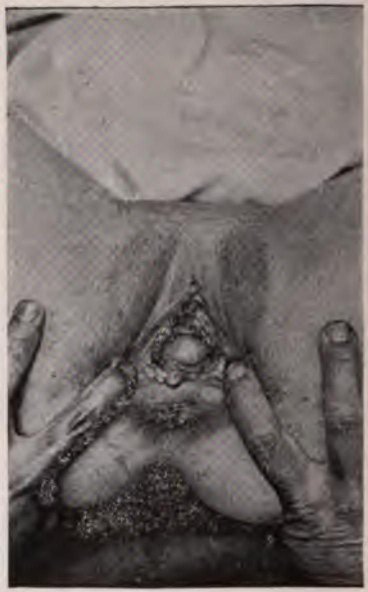


Fig. 370.—An old laceration from labor. Most of the perineum has been torn and there is protrusion of the posterior vaginal wall (posterior colpocele). (Baldy—*American Textbook of Gynecology*.)

6. In some cases the pelvic sling is seriously damaged without any open tear of the perineum or vaginal wall. In such a case there is no open wound to be seen or felt. In fact, in such a case it is difficult or impossible to make a positive diagnosis of laceration at the time, because of the marked stretching and distortion of the parts that normally takes place and is followed by no trouble. In such a case, the individual tears in the muscles are probably small and numerous. The diagnosis is made later, when it is found that the pelvic floor is weak and does not furnish proper support. Such cases are, by some writers, designated as "relaxation of the pelvic floor." But there is no reason why the term "relaxation" should be applied to this form of tear any more than to the open tear. Of course, a condition of relaxation is found after all severe injuries of the pelvic floor, but that simply means that there has been a tear, either open or subcutaneous, and the condition should be considered under the head of laceration.

Skene mentions having seen three cases of such subcutaneous injury in which the sphincter ani was also torn. Each patient had incontinence of feces, and yet the most careful examination failed to show any evidence of an open tear, either over the perineum or in the vagina.

Results of the Laceration

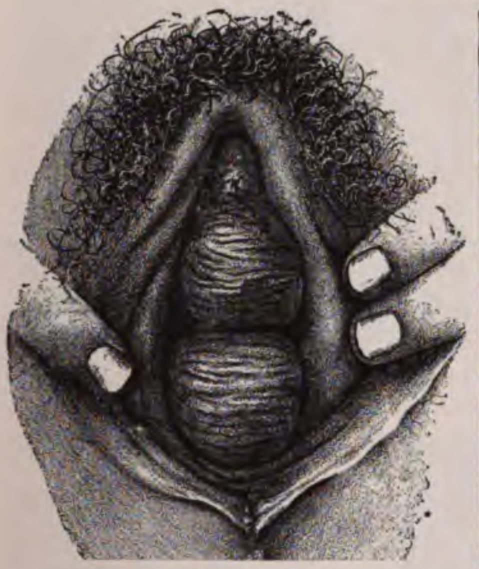


Fig. 371.—Cystocele and rectocele of moderate extent. (Thomas and Munde—*Diseases of Women*.)

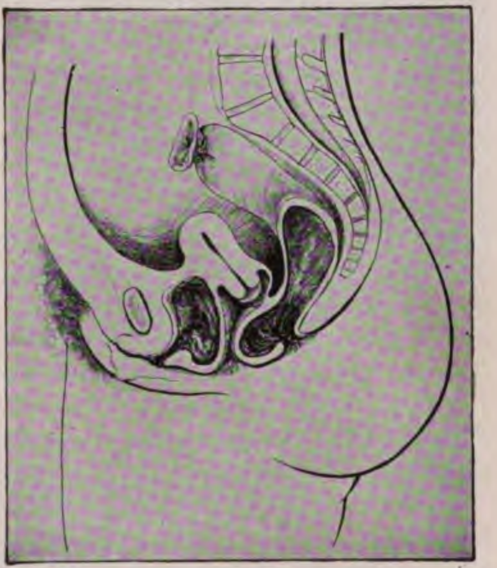
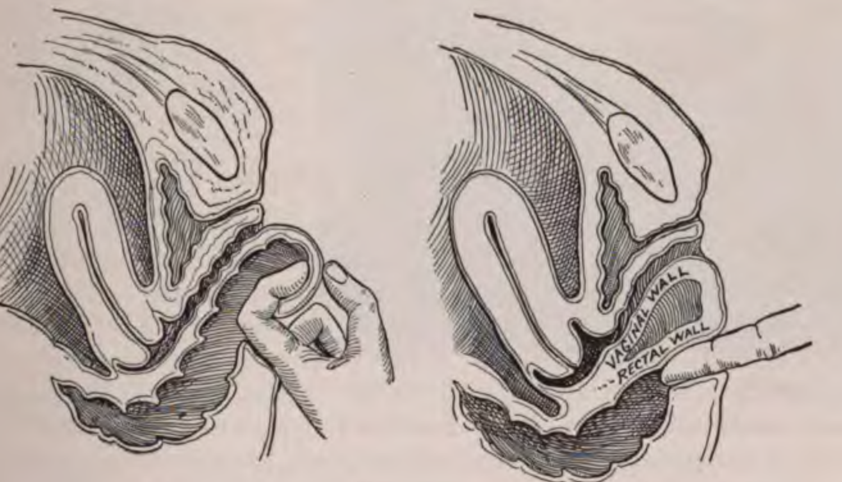


Fig. 372.—Cystocele and rectocele of moderate extent. Sectional view. (Thomas and Munde—*Diseases of Women*.)



A. *B.*

Fig. 373.—Method of differentiating between rectocele and posterior colpocele. The index finger in the rectum determines whether or not the rectal wall follows the prolapsing vaginal wall. The hand should be gloved. *A*, rectocele. *B*, no rectocele. (Ashton—*Practice of Gynecology*.)

In laceration of the pelvic floor, not repaired at once, there is decided increase in the chance of infection following labor. If the patient escapes sepsis, there is not much discomfort until she gets up and about, for as long as she is lying in bed the loss of support at the pelvic outlet is but little noticed. Of course, if the tear has extended into the rectum there is incontinence of feces.

After the patient has been up and about the house for a short time, she notices decided weakness in the pelvis, which becomes more marked as she becomes otherwise stronger and attempts more work. She complains of a dragging weight in the pelvis and of backache. As the uterus sinks in the pelvis, the cervix frequently goes forward, as well as downward, and the fundus goes backward in retroversion. This tendency of the cervix to sink downward and forward is increased by the inflammation and subinvolution resulting from cervical lacerations, received in the same labor.

On inspection, it is found that, instead of a normal vaginal opening, the vaginal outlet is relaxed—that is, it is open and without tone or resistance (Fig. 370). The two index fingers introduced into the opening (Fig. 69) may be carried to the sides of the pubic arch with but little resistance. If now the patient be directed to bear down or strain, as in defecation, the sinking and protrusion of the parts become more marked, and the relaxation of the floor is more apparent. Another method of testing the relaxation of the floor is shown in Figs. 66 and 67. The margin of the untorn portion of the pelvic sling may often be felt on one or both sides in the vagina some distance from the vaginal orifice.

Though in most cases of laceration, the vaginal orifice is widened and patulous and the remaining perineum very narrow, in some cases the skin surface of the perineum is intact and the vaginal orifice is small and placed at the normal distance from the anus. A superficial examination of such a patient would lead to the conclusion that the pelvic floor was intact, but examination within the vagina (Fig. 66) shows marked relaxation, establishing the fact of serious laceration of the pelvic sling.

Subinvolution of the vagina with more or less atrophy of the pelvic muscles, results from unrepaired laceration of the pelvic floor.

Effects of the Loss of Support

The cervix sinks into the pelvis and comes forward and the fundus uteri frequently goes backward into **retrodisplacement.** Also, the whole uterus lies too low in the pelvis, constituting **prolapse** of the uterus.

As the damaged pelvic floor and other supports of the uterus gradually stretch more, the uterus may sink so low that the cervix appears at the vaginal opening. As the uterus sinks lower the vaginal opening enlarges and the vaginal walls roll outward, forming anterior or posterior **colpocele** (Fig. 370).

With the prolapsed posterior vaginal wall, sometimes the anterior wall of the rectum is found, forming a **rectocele** (Figs. 371, 372, 374, 375). An appearance resembling rectocele may be produced by prolapse of a thickened vaginal wall. There is areolar hyperplasia and often considerable venous dilatation, giving quite a large projecting mass, but without displacement of the anterior rectal wall. Whether or not rectocele is really present, is easily ascertained by rectal examination, to determine if the anterior rectal wall is pouched forward with the vaginal wall (Fig. 373). In some cases of rectocele, a large pouch is formed and interferes much with emptying the rectum, it being necessary for the patient to push back the protruding rectocele to secure satisfactory bowel movement (Fig. 375).

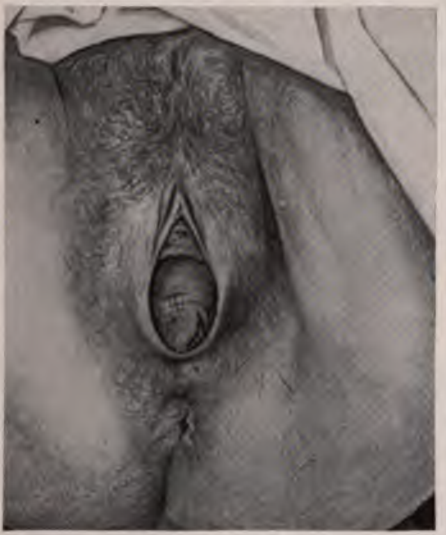


Fig. 374.—Small rectocele. (Hirst—*Diseases of Women.*)

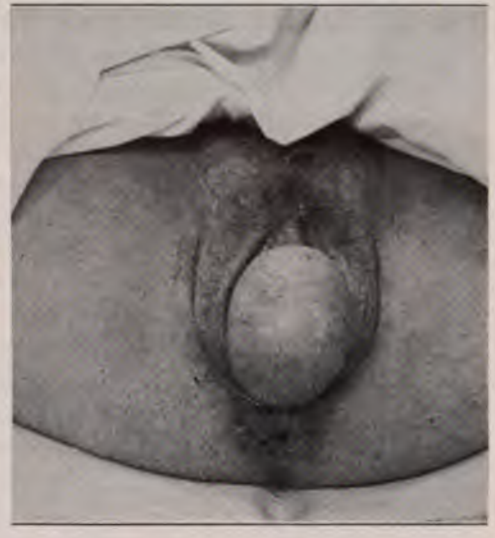


Fig. 375.—Large rectocele. (Hirst—*Diseases of Women.*)

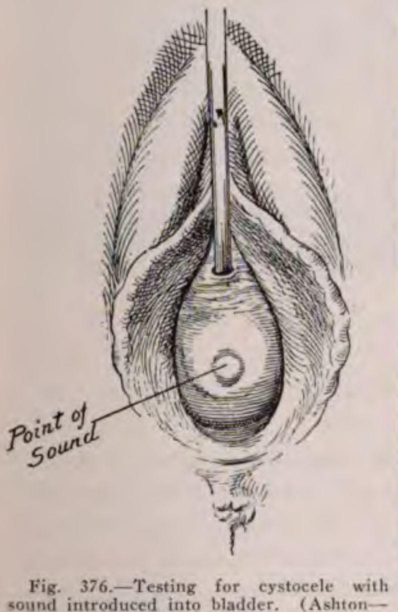


Fig. 376.—Testing for cystocele with sound introduced into bladder. (Ashton—*Practice of Gynecology.*)

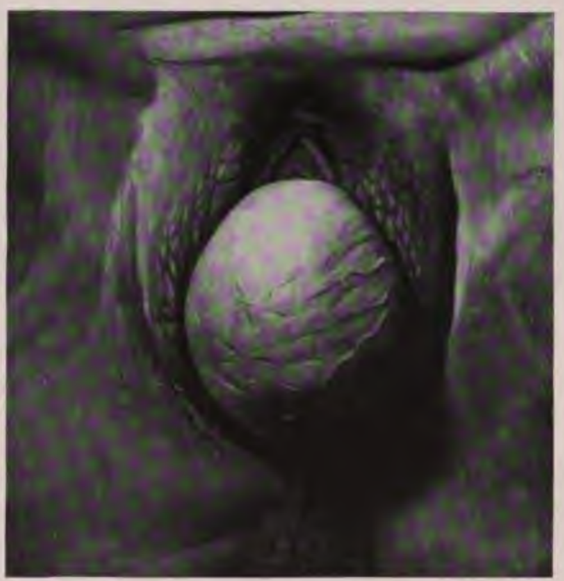


Fig. 377.—Large cystocele. (Montgomery—*Practical Gynecology.*)

If the base of the bladder follows the prolapsing anterior vaginal wall, the condition is known as **cystocele** (Figs. 371, 372, 377). It can be determined by a sound or stiff catheter in the bladder (Fig. 376). Sometimes a supposed cystocele is found to be only vaginal wall. In marked cystocele, a large pouch is formed at the floor of the bladder, in which residual urine remains and decomposes, causing much bladder irritation. It is sometimes necessary for the patient to push back the protruding cystocele before a satisfactory evacuation of the bladder can be secured. Straining at defecation or urination greatly aggravates the cystocele. In some cases both rectocele and cystocele are present (Figs. 371, 372).

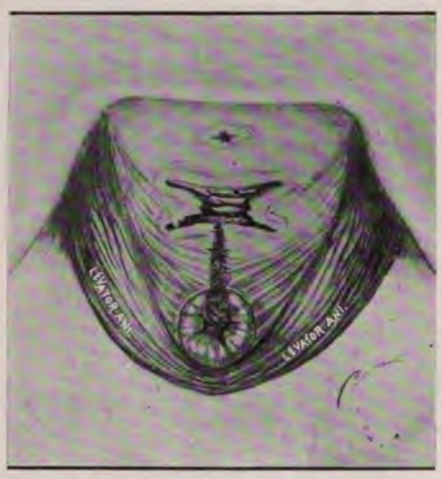


Fig. 378.—A laceration extending directly through the sphincter ani muscle and other structures between the vagina and rectum. The levator ani muscles are not involved. (Gilliam—*Practical Gynecology*.)

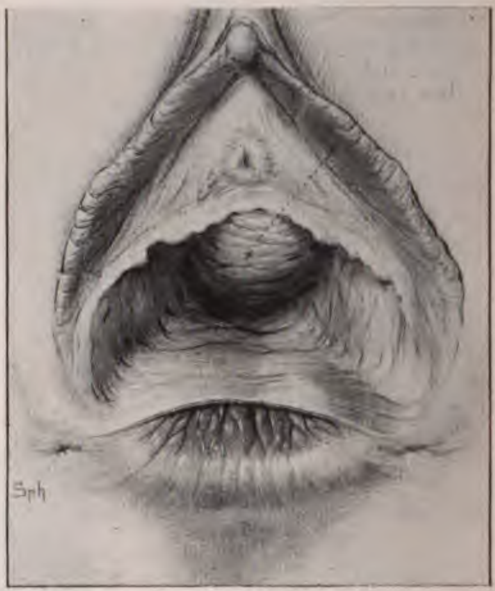


Fig. 379.—Representation of the conditions present in an old laceration through the sphincter ani. Notice the wide separation of the sphincter ends and also the exposed rectal mucosa. Each end of the torn sphincter ani muscle is indicated by a slight dimple in the skin. (Kelly—*Operative Gynecology*.)

When the vaginal entrance is relaxed, air can enter the vagina, and it is sometimes expelled with more or less noise, which is very annoying to the patient. This phenomenon is known as "flatus vaginalis." It is merely a symptom of relaxed vaginal orifice. It was formerly described under the queer title of "garrulity of the vulva."

Laceration of Sphincter Ani Muscle

If the laceration of the pelvic outlet has extended through the sphincter ani muscle (Fig. 378), there will be incontinence of feces and intestinal gases, making the patient miserable and excluding her from society. When completely torn, the sphincter ani retracts—sometimes to such an extent that it scarcely reaches half way around the rectal opening. It may be felt as a thick cord at the posterior part of opening. A slight dimple, or retraction of tissue, frequently marks the location of each end (Figs. 379, 380, 381). A small area of the rectal mucous membrane may be visible as a red inflamed-looking spot, marking the situation of the anus (Figs. 380, 381).

If the sphincter muscle is not completely torn, a few fibers remaining intact, the patient may be able, even from the first, to retain solid feces—that is, there is only partial incontinence. In these cases of partial rupture of the sphincter, and also in cases of complete rupture in which the muscle was paralyzed by the stretching before rupture and the ends of the muscles or tissues close to the muscle lay in contact and became partially united, the patient has control of the bowels except when diarrhea is present. In some cases the patient has control over feces, both solid and liquid, but there is incontinence of gases.

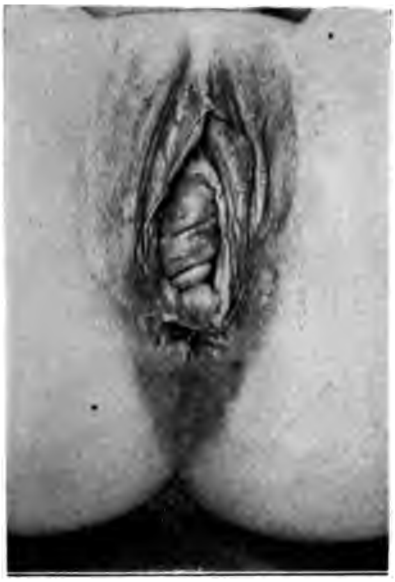


Fig. 380.—Complete laceration of the perineum. The sphincter ani muscle has been torn and the ends are separated. The small dark area is an exposed portion of the red mucosa of the rectum. (Hirst—*Diseases of Women.*)

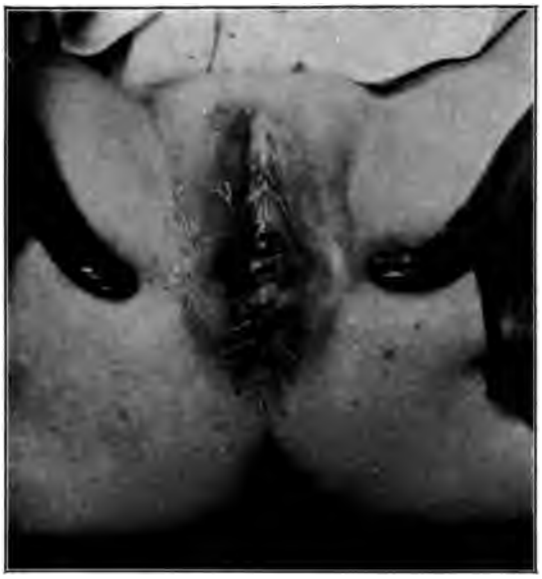


Fig. 381.—Another case of laceration through the perineum into the rectum. Notice the separation of the sphincter ends and also the patch of rectal mucosa. (Hirst—*Diseases of Women.*)

In some of these cases of partial incontinence, a wide area of scar-tissue lies between the ends of the muscle. In such, do not be misled into the belief that there has not been a rupture of the sphincter. The rupture of the muscle is practically complete and the ends must be denuded and united the same as if the patient had no control of the bowels.

A laceration through the sphincter ani muscle and rectovaginal septum, does not necessarily mean that there has been great damage to the pelvic sling. The principal part of the sling passes back of the rectum, not between it and the vagina (Fig. 361, 367).

If the rectal tear is accompanied by deep lacerations at the sides of the vagina, involving the levator ani muscles, then there will be marked loss of support in the pelvic floor and consequent relaxation of the vaginal outlet. Such accompanying deep lateral lacerations do frequently occur with the result mentioned. But in some cases, the tear in the median line into the rectum seems to have been the only serious damage. In such a case, the incontinence of feces is the only troublesome symptom, there being no evidence of want of support for the pelvic organs.

This essential difference between median and lateral lacerations, explains why it is that some cases of complete perineal laceration with incontinence are not accompanied with the prolapse of the uterus and vaginal walls, so frequently seen in incomplete perineal lacerations. On the old theory that the perineum was the important supporting structure at the pelvic outlet, this class of cases was inexplicable. Since the facts in regard to the anatomy and function of the component parts of the pelvic floor have become known, these cases are easily explained.

Complications

In old lacerations of the pelvic floor, there are frequently present vaginal discharge, painful menstruation, irregular menstruation, excessive menstruation, attacks of severe pelvic pain, dyspareunia, sterility, abortion, various reflex phenomena and general poor health. These symptoms however are due principally to **associated diseases**, some of which may be traced to the laceration. The diseases which are frequently associated with laceration of the pelvic floor are:

Laceration of cervix.
Chronic endometritis.
Subinvolution.
Retrodisplacement of uterus.
Prolapsus uteri.
Chronic salpingitis.

All lesions present should be found and their severity determined before operative treatment is undertaken.

Treatment

In a **fresh laceration** of the pelvic floor or perineum in labor, the rule is to repair the injury at once. Even though the tear is not deep enough to damage the pelvic floor, it should be repaired, for every laceration closed lessens to that extent the chance of infection. For the same reason, tears of the anterior vaginal wall or of the vulva should be repaired at once. The details of this immediate repair belong to obstetric work, and need not be considered here.

In an **old laceration** repair of the pelvic floor, months or years after the injury, is a much more tedious operation and requires more preparation and skill. The parts have been stretched out of their normal relations and the contraction of the scar-tissue has drawn mucous membrane over the damaged areas.

Palliative Measures.—In a case of old laceration, waiting for operation or in which operation is not advisable, considerable temporary relief may be afforded by the knee-chest posture, taken for a few minutes morning and evening. In some cases the patient is made more comfortable by some one of the pessaries useful in retrodisplacement or prolapse (see Figs. 549 and 578). Vaginal tamponade also gives some temporary relief. Astringent douches, rest in the recumbent posture several times daily, and the various means for reducing pelvic congestion are useful palliative measures.

Operative Treatment.—For permanent relief, operation is necessary. Many operative procedures have been designed, the principal ones of which are mentioned below.

Object of the Operation

The object of the operation is to restore a strong sling across the pelvic outlet to support the organs above. To restore the integrity of the pelvic floor, the following two things must be accomplished:

1. The musculo-fibrous pelvic sling must be shortened so that the slack is taken up.

2. The vaginal opening (the necessarily weak place in the pelvic floor) must be brought forward under the pubic arch and, consequently, out of the line of direct pressure from above.

Repairing the perineum is known as "perineorrhaphy." Suturing the vaginal wall is designated as "colorrhaphy."

Though the literal meaning of each of these terms is limited, they are by common consent used to indicate the general suturing usually necessary in these cases. A more accurate and comprehensive designation for this operation is "repair of the pelvic floor." This operation comes under the general class known as "plastic operations," which includes also repair of cervix, operation for cystocele and closure of fistulae.

Indications and Contraindications

The **indications** for repair of the pelvic floor are:

1. Decided symptoms of loss of support at the pelvic outlet—such as dragging weight in the pelvis, backache and a feeling of weakness there.
2. Prolapse of the vaginal walls, with or without cystocele or rectocele.
3. Prolapse of the uterus.
4. Movable retrodisplacement in which a pessary cannot be retained, on account of the laceration at the vaginal outlet.
5. Incontinence of feces, indicating damage to the sphincter ani.

The **contraindications** are:

1. Absence of decided symptoms of loss of support in the pelvic floor.
2. Marked kidney lesion or other serious disease contraindicating anesthesia.
3. Hemophilia. Skene encountered three such patients. Two of them were operated on before the bleeding tendency was discovered, the result being failure of the operation in each case and, as he remarks, "the de-

ment of extreme caution on the part of the operator in selecting cases in the future." In the third case, the fact that the patient was a "bleeder" was elicited in getting the history, and consequently the operation was not advised.

4. Uterine disease with an infectious discharge. The uterine disease should be treated and the infectious discharge checked before any plastic operation is undertaken.

Preparations for the Operation

The preparations for repair of the pelvic floor may be divided into (1) preparation of the patient, (2) preparation of the instruments and dressings and (3) preparation of the operator and assistants.

1. **Preparation of the Patient.**—The general preparations as for any operation requiring an anesthetic, are carried out (see preliminary preparation of patient for Abdominal Section, Chapter XVI).

It is well to time the operation so that the healing surfaces will not be disturbed by the menstrual flow for ten days or two weeks after operation. Consequently, the preferable time for the operation is from three to ten days after menstruation. The antiseptic preparation of the patient in this particular operation is confined to the vagina and adjacent regions. The patient should receive an antiseptic douche once or twice daily up to the time of operation. Several hours before operation or the day before, the field of operation should be shaved. The shaving includes the pubic and perineal regions and the adjacent portions of the thighs and buttocks.

After the patient is under the anesthetic, the vagina is scrubbed thoroughly with warm soap solution, using cotton-balls held in long forceps. Two fingers of the left hand are introduced into the vagina and all portions of the vaginal walls are put on the stretch as they are scrubbed. A brush is too harsh for the purpose and it cannot be handled as satisfactorily as the cotton in the forceps. The external genitals and the entire field of operation is again scrubbed with the soap solution. The soap is then washed off with sterile water, the surfaces dried, and a 5 per cent solution of picric acid in alcohol is then applied externally and in the vagina. The sterile cloths are then placed about the field and the patient is ready for operation.

2. **Preparation of Instruments and Dressings.**—The details of the antiseptic preparation of the instruments and dressings are given under Preparations for Abdominal Section, in Chapter XVII.

The instruments required for repair of the pelvic floor are shown in Figs. 382 and 383.

There should be at hand also:

Leg holders, in the form of uprights attached to the table.
Perineal pad.
Fountain syringe.
Rubber apron for operator.
Gowns for operator and assistants.

For the anesthetist there should be:

- Ether inhaler and chloroform inhaler.
- Ether and chloroform.
- Tongue and forceps.
- Vaseline, for patient's face.
- Hypodermic syringe.
- Necessary stimulants.

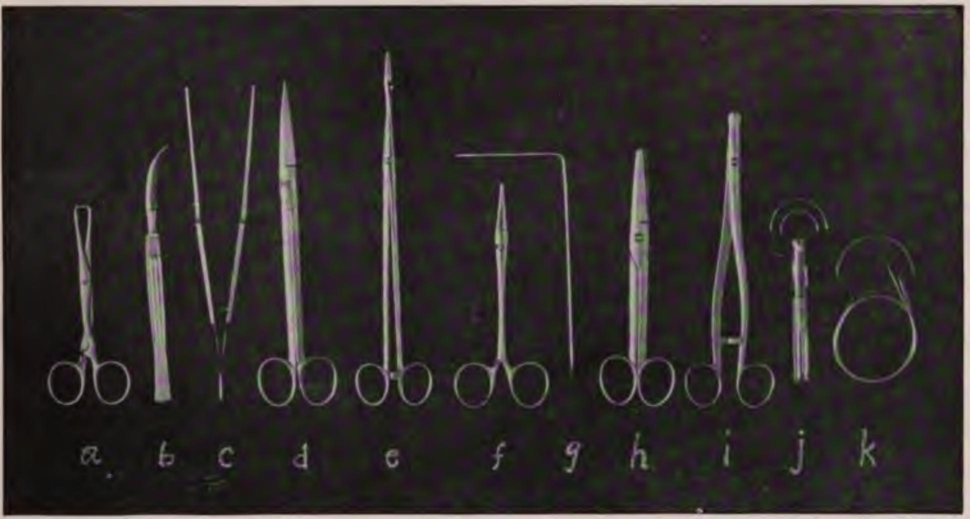


Fig. 382.—Instruments for repair of the pelvic floor: *a*, short, tenaculum forceps (have four); *b*, bistoury; *c*, long tissue forceps; *d*, long scissors for denuding; *e*, vaginal dressing forceps for sponging (have two); *f*, hemostat forceps for holding suture ends or catching bleeding points (have eight); *g*, right-angled vaginal retractor (have two); *h*, short scissors for cutting suture material; *i*, Sims' needle-holder. *j*, number 2, 20-day catgut (have six tubes) and strong full-curved round-point needles (have four); *k*, silkworm-gut (have eight strands) and large full-curved Hagedorn needles (have four). The large needles may be used without a needle-holder.

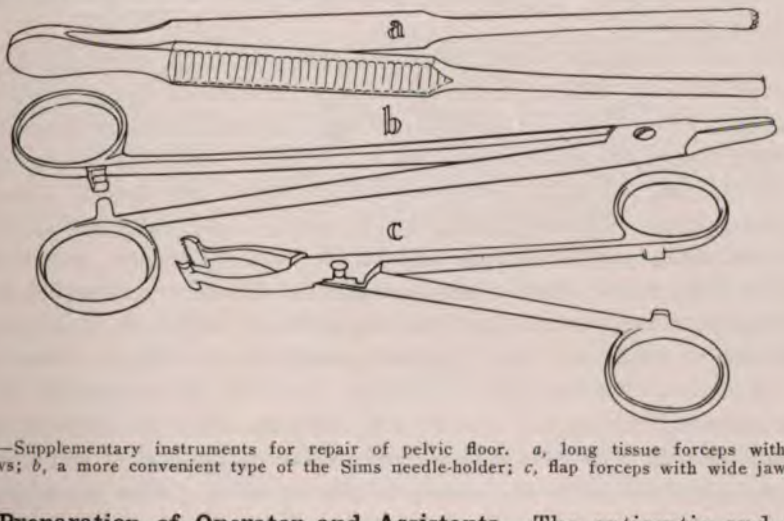


Fig. 383.—Supplementary instruments for repair of pelvic floor. *a*, long tissue forceps with serrated jaws; *b*, a more convenient type of the Sims needle-holder; *c*, flap forceps with wide jaws.

3. **Preparation of Operator and Assistants.**—The antiseptic and aseptic preparation for the operator and assistants for operative work in general, is given in detail under Preparations for Abdominal Section (Chapter XVII).

Two assistants, beside the anesthetist, are needed for rapid work, one to expose the various portions of the field of operation and the other to sponge away the blood and handle sutures. A good nurse does well as one of these assistants.

OPERATIVE METHODS

The treatment of relaxation of the pelvic floor consists in taking up the slack, so that the pelvic sling is sufficiently shortened, and in restoring the perineal body, so as to carry the weak place in the pelvic floor (the vaginal opening) forward, out of the line of direct pressure.

The pelvic sling, the strong supporting part of the pelvic floor, consists of the levator ani muscles and the fascia above and below. This musculofibrous sling or diaphragm (Figs. 361, 366) is the structure worked upon in repair of the pelvic floor. Shortening of this sling restores the pelvic floor support, while if there is no shortening of the sling, there is no lasting restoration of support.

As operative treatment for this condition deals principally with one structure (the pelvic sling), there is not the confusing multiplicity of radically different operations found in the treatment of uterine retrodisplacement and prolapse, where many different structures may be utilized for support. For restoration of the pelvic floor there is just one modern operation and its essentials are (a) exposure of the musculofibrous sling by incision through covering mucosa or skin, (b) shortening of the sling and coaptation of the perineal tissues, and (c) closure of the wound in the superficial tissues. The incision through the vaginal mucosa of perineal skin is simply to allow access to the deeper and more important structures. It corresponds to the incision through the abdominal wall in abdominal work. The pelvic floor is "opened" to allow access to the real supporting structures, and when they are repaired the opening is closed.

There are variations of technic in the different steps, particularly in the opening and closing. The methods of opening and closing the pelvic floor differ so much that one may be inclined, on first thought, to class them as radically different operations. A closer study, however, will show that the really important feature, the approximation of the muscles and fascia between the vagina and rectum, remains practically the same. Also, there are slight variations in suturing and in approximation of the deep tissues, but these are only minor differences. For a time a radically different method of shortening the levator sling was in use. This consisted in excising a portion of the sling on one or both sides and approximating the cut edges. This proved useful, for it demonstrated and emphasized that the shortening of the sling was the important thing. It was found, however, that the necessary shortening could be more easily and more effectively accomplished by subvaginal approximation of the sides of the musculofibrous sling. This is a physiologic but not an anatomic restoration of the pelvic floor. In fact, anatomically it is a marked distortion of the parts, in that it throws the main supporting sling between the vagina and rectum instead of back of the rectum as it is normally. Much energy and good paper have been wasted in arguing for a perfect "anatomic" restoration of the pelvic floor—that is, a restoration exactly "as Nature made it." The operation under consideration has been lauded as such, but it is not. However, it gives support, relieves the symptoms and enables the patient to pursue her activities in comfort, which, after all, is the ultimate result sought.

This effective and satisfactory operation was not completed by the originator. It was of slow growth, and reached its present perfection through the pioneer work of many men through many decades. In the fifty years prior to 1880, much work was done in repair of the pelvic floor, but it was practically confined to excision of portions of the vaginal mucosa and suturing of the resulting wounds. Emmet, in his epochal work in the early eighties, pointed out the necessity of reaching and uniting the deeper structures of the pelvic floor. His "butterfly" denudation exposed the injured area in each lateral sulcus, and he insisted that the sutures be passed so as to include the deep tissues of the sides of the sulcus. The importance of this point was partly obscured by the emphasis placed on the form of denudation, which seemed to fill the eye of operators. Much ingenuity was displayed in devising forms of denudation. Later it came to be recognized that it was not the form of denudation but the inclusion of the deeper tissues in the sutures that determined the permanency of the result. Soon it was appreciated that the best result was secured by a definite shortening of the levator ani muscles with the associated fasciae. There were two methods of shortening this musculofibrous sling. It could be shortened by the lateral excision or folding, or by approximation of the two sides of the sling between the vagina and the rectum. Various methods were proposed for exposing the sling and for shortening the same, and "new" operations for restoration of the pelvic floor appeared in great number. Reduced to essentials, however, each new operation fell into one or the other of the two classes mentioned—that is, the sling was shortened by lateral excision or folding or it was shortened by median approximation between the vagina and the rectum. After prolonged trial it was established that the latter method was the preferable one. This accomplishes the desired object most effectively and in the simplest way. Consequently the other method (lateral excision or folding) has dropped out of use, and may now be classed among the "former operations."

Subvaginal approximation of the sides of the pelvic sling remains, then, the one advisable operation for repair of the pelvic floor. Among different operators there are decided differences in regard to minor details, as previously explained. But the essential features are generally recognized and usually followed.

As to whom credit is due for the various steps in the development of this operation, a full exposition of that would require a detailed historical review of such length as to be out of place here. The primary impetus to the inclusion of deep tissue came principally from the splendid work of Emmet. In later pioneer work, Hegar and Tait were prominent. The Tait method of denudation by raising a flap (so-called flap-splitting) is, with modifications, the method now most generally employed for opening the pelvic floor.

The later work with the deep structures developed gradually as the result of suggestions by a large number of operators, each contributing somewhat to the general advance. The perfected operation is not due to any one person but to many, and the author hesitates to single out individuals on account of possible injustice to those not mentioned. However, it may be stated that, as far as the author has noted, shortening of the musculofibrous sling by definite exposure and excision laterally, was first described by Harris in 1897. (Jour. A. M. A.) In the same year a method of subvaginal approximation of the sides of the sling was described by Noble (Am. Gynec. and Obstet. Jour.). Since then the technic has been perfected by useful suggestions from many contributors.

TECHNIC OF OPERATION

The various phases of technic will be presented in the following order:

- Regular operation, according to the technic considered by the author most satisfactory.
- Variations in technic.
- Laceration through the sphincter ani.

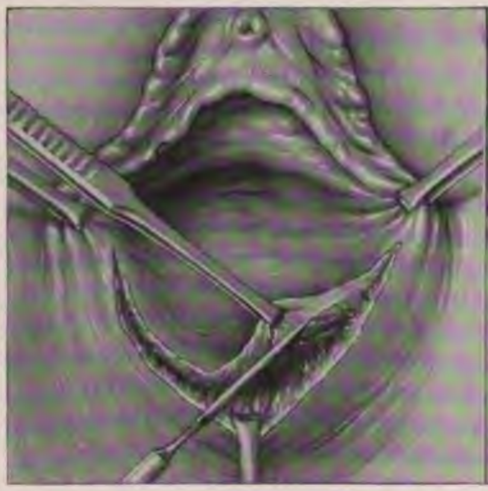


Fig. 384.—The edge of the vaginal flap is freed with a knife.

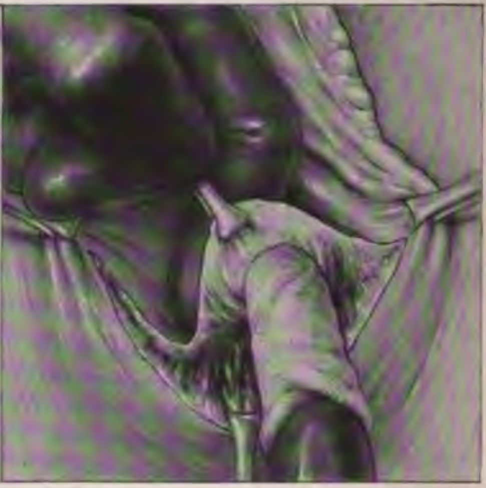


Fig. 385.—Next the underlying tissues are pushed off with the gauze-covered finger from the vaginal wall which is held tightly stretched over the index finger of the left hand by means of a forceps.

Steps in Regular Operation

1. *Planning the Restored Vaginal Opening.*—By careful examination of the vaginal entrance, the opening of the duct of the vulvovaginal gland may be identified on each side. Just below this on each side the tissue should be caught firmly with the tenaculum forceps or other holder. To determine whether repair to this point will leave a vaginal opening of proper size, the forceps may be crossed and the sides brought together.

Care should be taken to keep sutures and scar-tissue from the immediate vicinity of the vulvovaginal glands. If this duct on either side is included in the operation area, it is likely to give rise to a hypersensitive and troublesome scar and may result in definite cyst formation.

2. *Opening the pelvic floor.*—The incision extends from one forceps to the other (Fig. 384). It should be placed well within the vagina. When so placed it is farther removed from the rectum, and hence from infection, and is in tissue less sensitive than the perineal skin. If preferred, the line of tissue may be made tense and then clipped off with the scissors, or the tense line of tissue may be excised with a knife.

After the incision is made, a margin of the flap is bared by knife or scissors, as indicated in Fig. 384, and then caught with a forceps. With the gauze-covered finger the underlying tissues are quickly rolled off the vaginal flap sufficiently to expose the deep musculofibrous sling (Figs. 385, 386). The same step is then carried out on the other side. In this separation of the tissues from the vaginal flap, if there is much scar-tissue it may be necessary to divide it at some points with the knife or scissors.

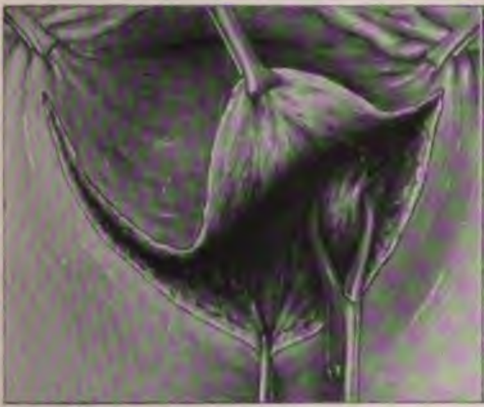


Fig. 386.—The musculofibrous sling is caught with a forceps and brought out for identification and to permit more accurate placing of the sutures.

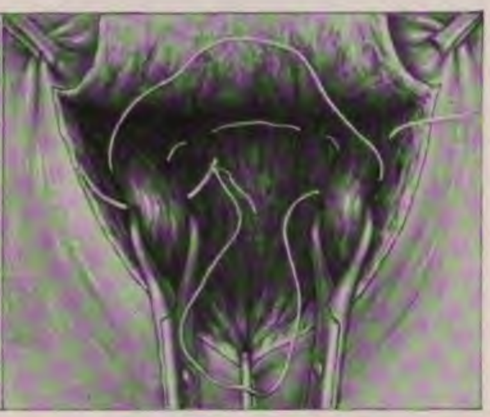


Fig. 387.—Sling lifted out with forceps on either side. First approximation suture passed, making two rounds with suture before tying.

Care must, of course, be exercised, to avoid opening into the rectum. The layer of veins constitutes the guide to safety. So long as the line of cleavage is kept between these veins and the vaginal wall, the rectum is safe. On the other hand, when the veins are permitted to remain on the vaginal flap, the line of cleavage is going too deeply and a hole may be torn into the rectum at any time.

3. *Identification and isolation of the musculofibrous sling.*—When the vaginal flap is raised sufficiently, the smooth surface of the sling may be seen. When exposed on both sides, the sutures may be passed through the tissues in that situation under the guidance of the finger. The author prefers, however, to catch the sling on each side, in a tenaculum forceps and draw it well into view, as shown in Figs. 386 and 387. By this means the tissues are more

positively identified as part of the pelvic sling and the sutures may be placed more accurately.

4. *Approximating the sides of the sling.*—The exposed sides of the sling are fastened securely together by sutures, as indicated in Figs. 387 and 388. It is well to pass the suture twice, so that there is a double suture or two rounds to each knot, each round of the suture including a somewhat different portion of the pelvic sling. Too many knots increase the chances of irritation and suppuration. When one suture has been passed and tied, it may be left long to serve as a tractor (Fig. 388) and the tenaculum forceps may then be removed.

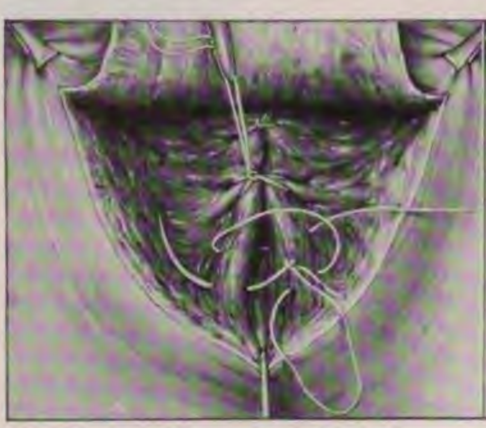


Fig. 388.—The last suture placed and tied is left long to serve as tractor after forceps have been removed.

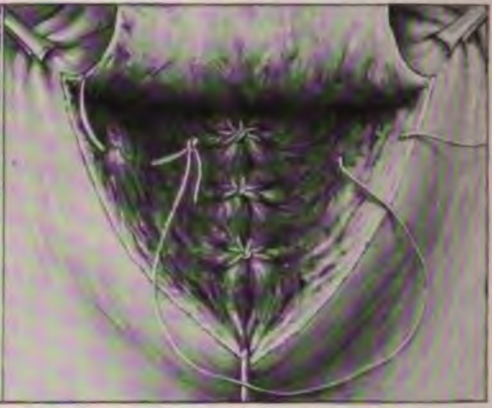


Fig. 389.—The approximation of the sides of the sling having been accomplished, the more superficial tissues of the perineum are united by interrupted sutures.

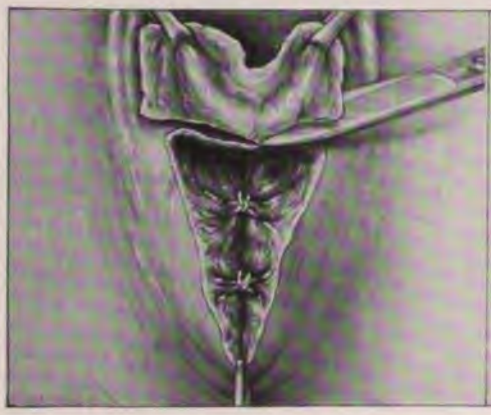


Fig. 390.—The excess tissue of the vaginal flap is excised.

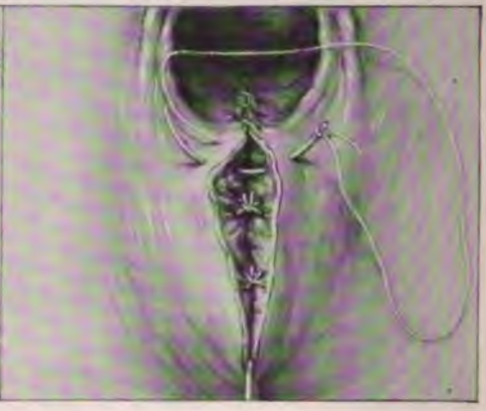


Fig. 391.—The vaginal and perineal wound is closed with a continuous catgut suture.

The sutures should not be too tight. There will be considerable reparative swelling of the tissues, and if the tissues included in the sutures are firmly constricted to start with, there may be sloughing. The sides of the musculo-fibrous sling should be approximated over a broad area, so as to secure a firm, broad union. Two or three sling sutures are usually sufficient.

Before placing other sutures, let the flap drop and test the size of the vaginal opening by introducing three fingers. At this stage of the operation the opening should admit three fingers easily (Fig. 392). It is narrowed considerably by the further steps of the opening and by the subsequent scar contraction, and if smaller than three fingers at this time, it is likely to cause trouble in coitus.

Having completed the approximation of the sides of the sling, the more superficial tissues of the perineum are united by sutures as desired (Fig. 389).

5. *Closing the opening in the pelvic floor.*—The excess of vaginal wall is trimmed away, as shown in Fig. 390, and the vaginal wound is closed as indicated in Figs. 390 and 391. If the excess of vaginal wall is not trimmed away, it is likely to form tags and irregularities which may prove troublesome afterward. The suture which closes the upper angle of the vaginal flap should take hold also of the deeper tissues, in order to fasten down this redundant area of vaginal wall.

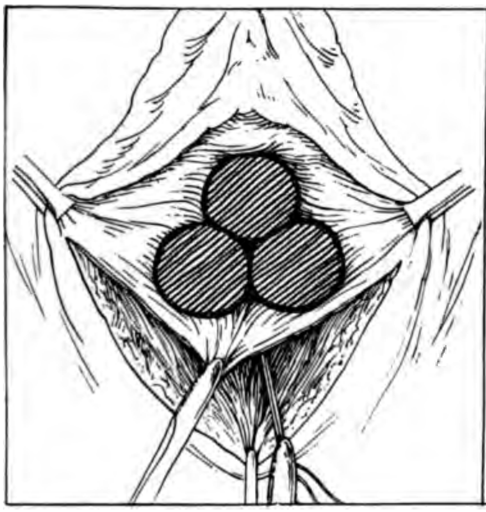


Fig. 392.—Testing the size of the opening immediately after tying the upper deep sling suture, to see whether the sling is repaired high enough. At this stage of the operation the opening should admit three fingers, as indicated.

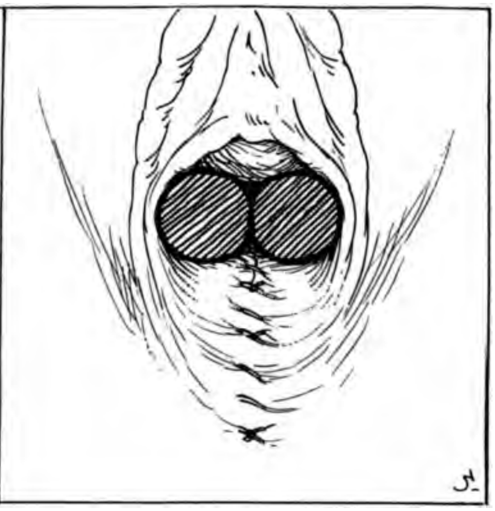


Fig. 393.—Testing the size of the vaginal opening at the close of the operation, when it should admit two fingers as indicated.

It is well to lock the running suture at intervals. If preferred, clips may be used to close the outer portion of the wound. For suture material, 40-day catgut No. 1 is very satisfactory throughout, for both deep and superficial sutures. If catgut chromicized for less than twenty days is used, tension sutures of silkworm-gut should also be employed. When the operation is completed the vaginal opening should easily admit two fingers, as indicated in Fig. 393.

Variations in Technic

Another method of separating the vaginal flap.—Some operators prefer to raise the flap by blunt dissection with scissors thrust under the vaginal wall.

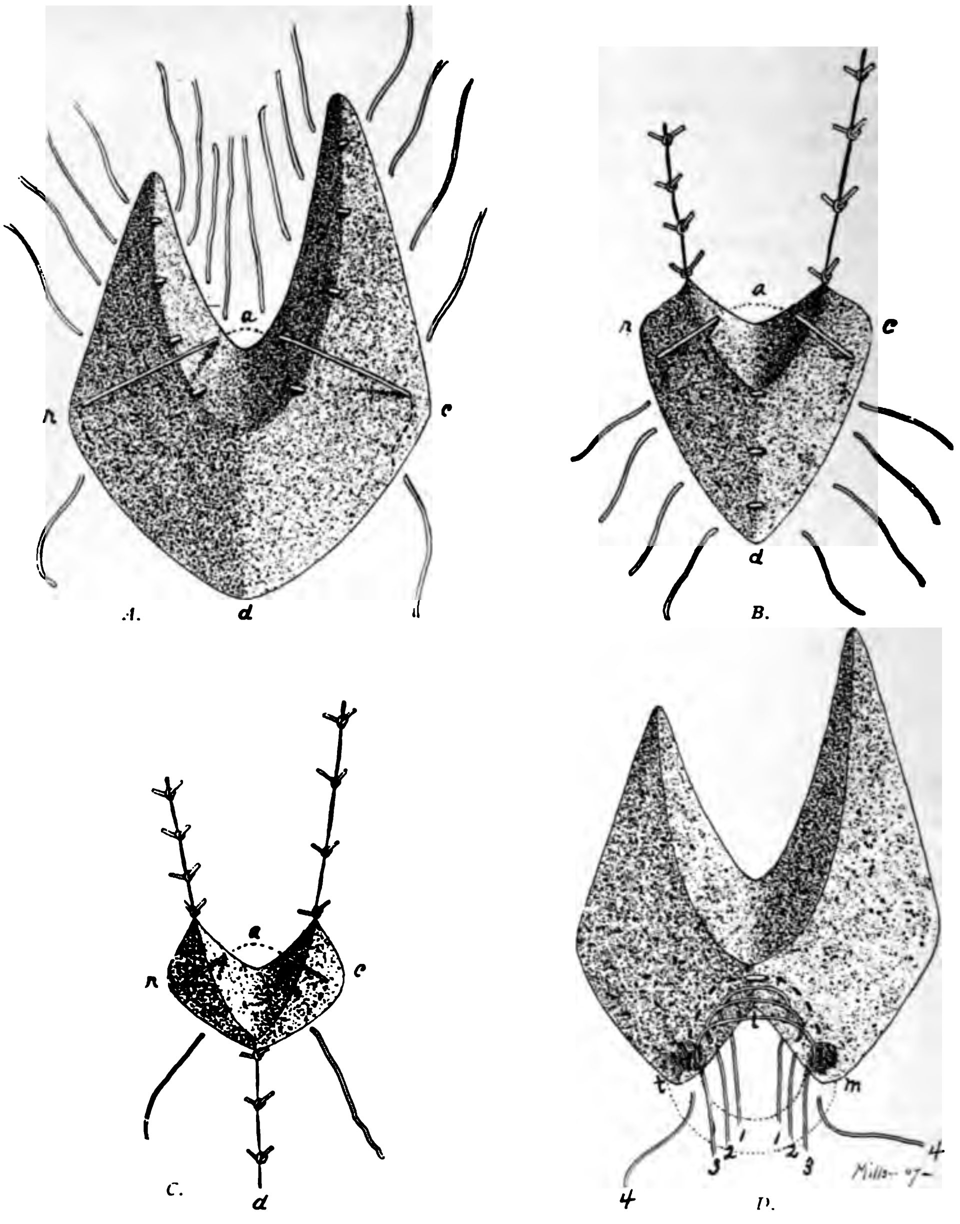


Fig. 394.—The general scheme for suturing in the Emmet operation.

A. The inside sutures passed, but not yet tied. These sutures may be interrupted or continuous, or if preferred, the deeper parts of the wounds may be approximated by buried sutures. The course of the "crown suture" is here indicated, but it is usually not passed until later.

B. The inside sutures tied and the outside sutures passed, including the crown suture. The "crown suture" brings together the points *r*, *a*, *c*. It is usually passed last.

C. The outside sutures tied, except the crown suture. The tying of the crown suture completes the approximation.

D. The additional sutures required when the tear extends into the rectum. The rent in the rectal wall is closed by sutures Nos. 1, 2 and 3. These are passed from the rectal surface and may be of catgut or fine silk. Suture No. 4 is passed from the skin surface. It is a strong suture of silkworm-gut and approximates the ends of the sphincter ani muscle and also the tissues above the rectal tear along its whole length. Care should be taken in passing it to catch the retracted sphincter ends and also the tissues all the way to above the apex of the rectal tear, as here indicated. Before this suture is tied, the torn and retracted ends of the sphincter ani muscle should be brought together by one or two buried catgut sutures.

Injury to the rectum is more likely to occur with this method than where the parts are laid open and the separation is made under the guidance of the eye.

Opening the pelvic floor by a vertical incision (*Hill*).—A vertical incision is made, extending to near the anus. Through this incision the sides of the pelvic sling are exposed by dissection with scissors. Then the prominent rectal wall is pushed back and, under the guidance of the fingers, sutures are passed into the sides of the sling, and the sides of the sling are approximated in the median line. Particular attention is given by Dr. Hill to the separate approximation of the superficial perineal structures. The operation is completed by the closure of the perineal incision.

Opening the pelvic floor by a low transverse incision (*Dorsett*).—A transverse incision is made a short distance above the anus. Through this the sides of the musculofibrous sling are exposed and brought together in the median line by buried sutures. The transverse perineal wound is then pulled apart in such a way as to make its long axis vertical. The wound is then closed from side to side, leaving a vertical line of union.

Excision of mucosa over a triangular area.—This is the Hegar method of denudation so long in use. The area is outlined with a knife, and the tissue is then removed in strips by scissors. This area of denudation may be used for the regular subvaginal approximation of the sides of the pelvic sling. After the denudation special care must be taken to expose the levator sling of each side, so that the deep sutures may be placed in the levator muscle and fascia, as indicated in Figs. 386 and 387.

Levator-approximation by figure-of-eight sutures.—For these sutures it is customary to use silkworm-gut. They are passed as follows: Through the skin to the patient's left side, through the sling on the left side, through the sling on the right side, then back through the sling on the left side, then through the sling on the right side again, and then out through the skin on the right side. When such sutures are tied, they approximate both the deep tissues and the superficial wound, and there are no knots or buried sutures left in the wound.

Holden uses chromic catgut for his figure-of-eight sutures, and passes them from the vaginal surface. Tracing each suture, it passes through the mucosa on the patient's left side, then through the right side of the sling, then through the left side of the sling and then out through the vaginal mucosa on the right side.

Emmet method of denudation (*Fig. 394*) is given principally because of its historical importance. It is not so satisfactory for the present-day operation on the deep structures as are other methods of opening the pelvic floor. When first used it was a great step in advance. It was also a very satisfactory method of opening the pelvic floor for shortening of the pelvic sling by lateral excision or by lateral folding. This, however, has now been superseded by subvaginal approximation of the sides of the sling in the median line, and consequently the "butterfly" denudation has passed out of use.

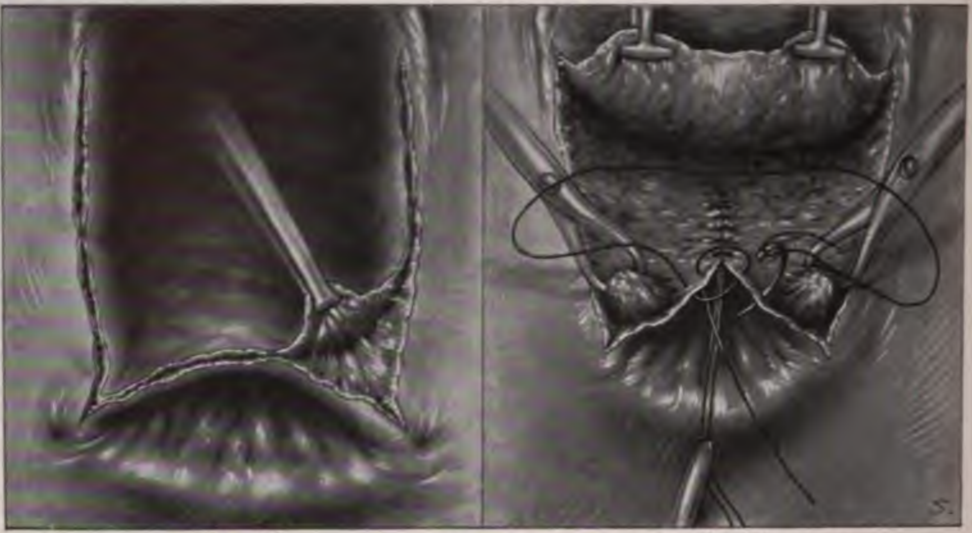


Fig. 395. Fig. 396.

Figs. 395 and 396.—Rectal suture method of repairing complete laceration. Fig. 395 shows line of incision. Fig. 396 shows method of suturing rectal wall.

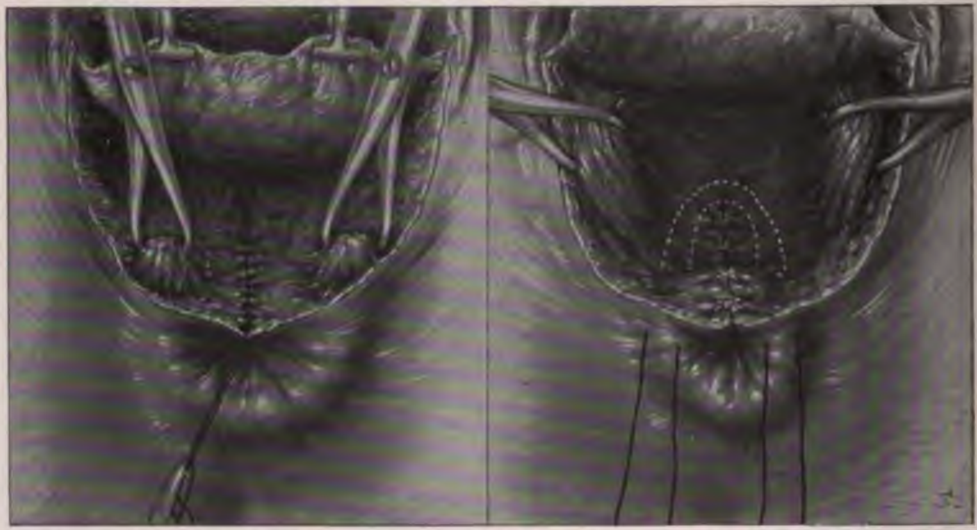


Fig. 397. Fig. 398.

Figs. 397 and 398.—Rectal suture method of repairing complete laceration. Fig. 397 shows rectal suture completed, and sphincter ends isolated ready for suturing. Fig. 398 shows sphincter ends sutured, and the reenforcing silkworm gut sutures passed.

Steps in Repair of Lacerated Sphincter Ani

When the tear has extended into the rectum (laceration through the sphincter "third degree tear") a more thorough preoperative preparation of the intestinal tract is required, for it is advisable that there be no bowel movement for a week to ten days after operation. The patient should be on restricted diet, principally liquids for two or three days before operation. She is to be given a moderate dose of castor oil one or two days before, an enema the evening before and colonic flushing the morning of the operation.

Additional steps are required also in the operative work. These steps vary somewhat with the type of operation selected. In one of the two operations in common use the rectal mucosa is trimmed and sutured separately to protect the repaired area from the rectal contents. In the other method a flap is turned down to protect the repaired area from the rectal contents. So we may designate the first the "rectal suture method" and the second the "flap method."

Rectal Suture Method.—In the technic of the operation there are four special points, but before considering these points directly, attention should be called to certain peculiarities of these tears.

A recent laceration into the rectum presents the condition shown in Figs. 378, 394-D. The torn and separated ends of the sphincter ani muscle are at "t" and "m" (Fig. 394-D). The apex of the tear in the rectal wall is at "l." But after several months a decided change has taken place in the relation of the parts. By the contraction of the sphincter muscle, its ends are still further separated, and this tends to pull down the apex of the rectal-wall tear, so that the line t-l-m becomes after a time, almost a straight line. This condition is well shown in Fig. 379, the torn ends of the sphincter being represented by the small dimple at each side of the widened anus. This condition is shown likewise in Figs. 380 and 381, where may be seen also the usual protrusion of a small area of red rectal mucosa.

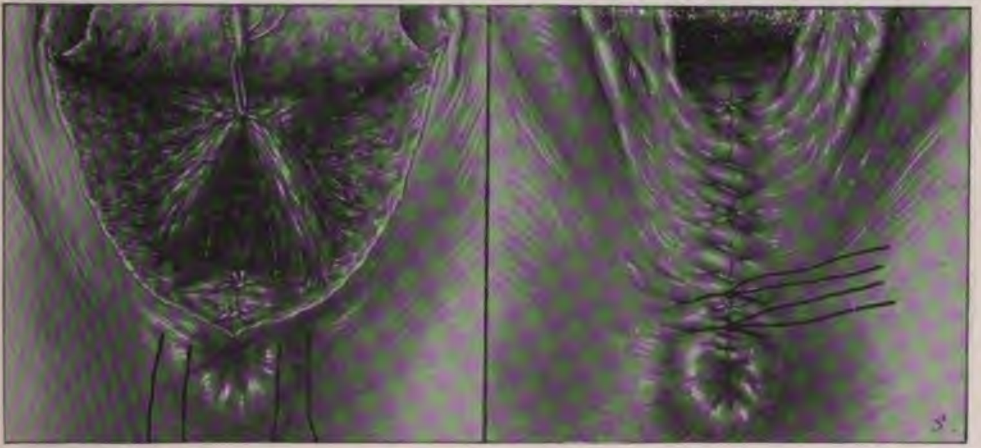


Fig. 399. Fig. 400.

Figs. 399 and 400.—Repairing rectal sling as usual and closing of wound.

The four special points in the technic above mentioned, are as follows:

a. Preliminary stretching of the contracted sphincter ani muscle should be carried out. The muscle may be felt as a small roll under the skin, in the situation indicated in Figs. 394-D and 379. At the beginning of the operation, before any denuding is done, the contracted sphincter muscle should be grasped firmly near each end, between the thumb and finger, and gently stretched. This overcomes the chronically shortened condition of the muscle and is further advantageous in that it produces temporary partial paralysis of the muscle and prevents, for a few days, the tugging on the sutured ends which would otherwise take place. It also permits the escape of gas and feces from the rectum with less discomfort to the patient and less danger to the wound.

b. The area of denudation is extended downward to the dimple over each end of the torn sphincter ani muscle, as shown in Fig. 395.

c. The tear in the rectal wall is closed by a separate row of sutures. These sutures are of fine silk. They take care of themselves and do not need to be removed. They are passed from the rectal surface as indicated in Fig. 394-D, and when tied the knots lie in the rectum (Figs. 396, 397).

d. The ends of the torn sphincter muscle are brought directly together. To do this it may or may not be necessary to clip out some scar-tissue. The ends of the sphincter are sutured securely together by chromic catgut (Figs. 397, 398), and then reenforced by one or two silkworm gut sutures as indicated in Fig. 398.

e. The subvaginal approximation of the sides of the pelvic sling are now made, as in the ordinary repair of the floor (Figs. 399, 400).

Flap Method.—In this method the incision is made well above the tear, as indicated in Fig. 401, and a flap is turned down (Figs. 402, 403) to protect the operated area from the rectal contents.

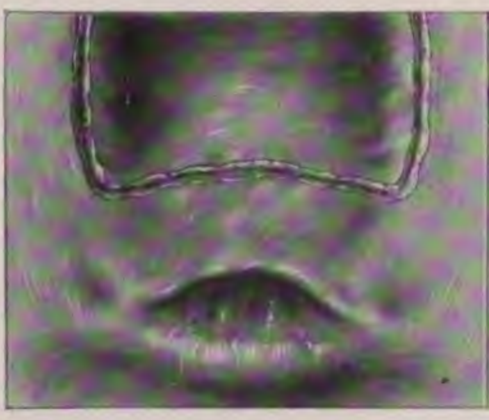


Fig. 401.—In flap repair of complete laceration, the incision is made about a half inch above the anal edge (Ristine, Watkins) well within the vagina so that no suture has to be placed either into the rectal wall itself or in close contact with the anus. A flap is dissected off, both upward and downward.

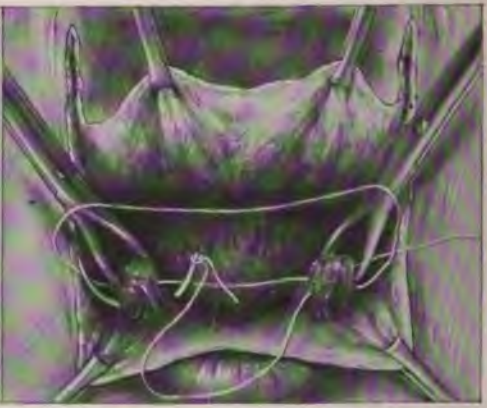


Fig. 402.—Flap method of repair. The ends of torn sphincter, visible as dimples on either side (Fig. 401), are dissected out, grasped with forceps, and united by means of a catgut suture passed in two rounds.

Ristine (American Journal of Obstetrics, 1899) first suggested an "apron" flap, and the operation has been further elaborated by Watkins (Surgery, Gynecology and Obstetrics, 1908). By placing the incision for the flap well within the vagina, from one-half to one inch above the edge, it was thought that two sources of infection, which so often annihilate the result of the most carefully performed repair, would be effectually eliminated.

The flaps are separated both in an upward and downward direction in the manner described for the regular repair of the incomplete laceration. Downward the flap is freed until on either side the end of the torn retracted sphincter muscle is reached, which is recognizable on the skin surface in shape of a little dimple (Fig. 401).

The sphincter ends are dissected out, caught with forceps and sutured, as shown in Fig. 402. A chromic catgut suture is passed in two rounds. In some instances it will be desirable to place two such sutures (Fig. 403).

Reinforcing silkworm-gut sutures, commonly used in the other method of sphincter repair, are not used in this operation.

After the sphincter injury has been repaired, the levator sling is shortened in the usual way as shown in Figs. 403, 404.

Theoretically the flap method seems the ideal operation, but practically it does not work out so well. In the more severe cases the flaps tend to slough or shrink, permitting extensive fecal leakage into the operated area. In the author's experience this has happened so frequently (in spite of particular care to preserve the nutrition of the flap and to make it large enough to allow for shrinkage) that he has returned to the rectal-suture method of repair in these cases.

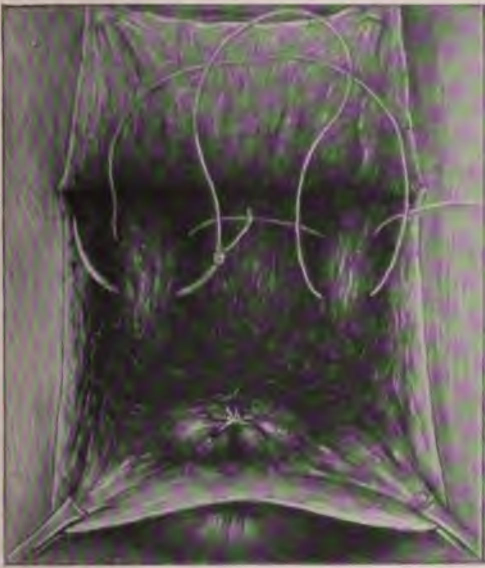


Fig. 403.—The approximation of the edges of the sling is accomplished exactly as in the operation for incomplete laceration, Fig. 388.

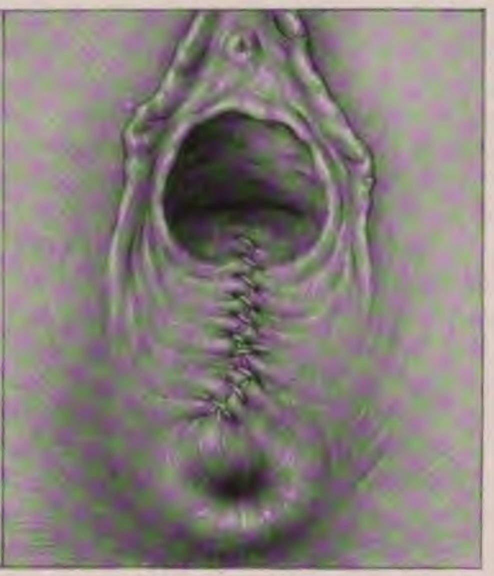


Fig. 404.—The wound is closed by means of a continuous suture.

After-treatment in Repair of the Pelvic Floor.—The details of the care of a patient after repair of the pelvic floor may be grouped as follows:

a. Knees Together.—For the first twenty-four hours after operation it is well to have the patient's knees held together by a bandage around them, a thick pad of cotton being placed between the knees to prevent discomfort. After the first day or two, the knees may be released, unless the patient is very nervous and restless. Ordinarily, the pain on separation of the thighs is decided enough to prevent injurious separation.

b. Changing the Dressing.—The genitals and pubic region must be kept covered with a large sterile dressing of absorbent cotton or gauze. When the dressing has to be removed for any cause, for example, to allow the patient to urinate, the nurse should proceed as follows:

Remove the dressing, slip the bed-pan under the patient and allow her to urinate. Cleanse the genitals by pouring a weak lysol solution (¼ per cent) or 1-5000 bichloride solution over them from a sterile pitcher (pitcher douche). Remove the bed-pan, apply a fresh sterile dressing and reapply the T-bandage.

c. RELIEF OF PAIN.—After a thorough repair of the pelvic floor there is, as a rule, considerable pain for the first few days. This consists of superficial smarting and deep aching and occasional sharp pains due to muscular action.

If the aching and pain is still sufficiently troublesome to prevent rest, give sodium bromide as necessary to allay nervousness and secure sleep, particularly at night. If the shooting pains through the perineum are persistent, it may be necessary to give codeine phosphate hypodermatically or by the mouth, in half-grain doses, repeated as often as necessary to give rest. In some cases heat to the perineum may be advisable.

The pains and soreness gradually disappear and after the first few days, as a rule, no sedatives are required.

d. DIET.—The day after operation liquid diet is given, and after that ordinary light diet, until the bowels have moved freely, when regular diet is gradually resumed.

When the laceration has extended through the sphincter ani, the patient should be kept on liquid diet exclusively until after the first bowel movement. In such a case it is well to have no bowel movement for seven to ten days, intestinal peristalsis being quieted by codeine in half grain doses, two to four times daily as needed.

e. CARE OF BLADDER.—If the patient can pass the urine herself, the author prefers to have her do so. The catheter should be used only if necessary. Aside from the ever-present danger of cystitis, the use of the catheter is a disadvantage in that manipulations necessary to catheterization disturb the parts and do more harm than the contact of healthy urine, especially as the urine is at once removed by the cleansing solution.

In many cases, however, particularly with deep lacerations, the patient cannot urinate at first and must be catheterized for one or more days. The frequency of catheterization depends somewhat on the quantity of urine secreted. Ordinarily it is required about every eight hours. For the details of catheterization see Chapter XVIII.

f. VAGINAL DOUCHES.—Ordinarily, it is preferable not to disturb the interior of the vagina with douches for the first three days. After that it is well to give a lysol douche (¼ per cent) once daily. In introducing the douche nozzle, the nurse should be careful to carry the point along the anterior vaginal wall so that there may be no chance of its going into the wound in the posterior wall.

g. CARE OF THE BOWELS.—After repair of the ordinary laceration, the bowels should be moved in three or four days by a purgative. Several hours after the purgative is taken, when the patient has a desire for bowel movement, an enema of two ounces of olive oil in a pint of water may be given. This softens the fecal masses, lubricates the rectum and does not cause the smarting that is often so troublesome after the ordinary soap-water enema. After that, laxatives should be given as necessary to secure one or two bowel movements daily.

In those cases where it has been necessary to repair the sphincter ani muscle and rectal wall, there should be no bowel movement for four full days. If necessary, some preparation should be given to keep the bowels quiet and prevent movement. When it is time for the bowels to move, a purgative is given and when the desire for defecation comes on, two to four ounces of olive oil should be injected high into the rectum and allowed to remain for some time. The oil softens the fecal masses and at the same time lubricates all the surfaces, so that there is much less danger of the rectal wound being torn open. When there has been repair of the rectal wall, the small oil enema is better than the large water enema, as the large quantity of water, if injected into the rectum, may stretch the healed wall and open the wound. Great care is necessary in giving the first enema after repair of a laceration extending into the rectum, and unless the nurse has had experience in such cases the physician had better give it himself. If the point of the syringe is directed too far forward it is apt to break open the rectal wound. On that account it is well not to introduce the hard rubber syringe point into the rectum but to introduce a soft rubber catheter and give the injection of oil through that. The patient should be cautioned to avoid all straining efforts in defecation. If the bowels do not move easily and without straining, she should wait for a repetition of the needed enema or purgative.

h. Removing the sutures.—If silkworm-gut sutures have been used, they are removed in eight to twelve days. By that time they have usually begun to cut into the tissues and no longer give support. The inside sutures in the vagina and in the rectum take care of themselves.

i. Getting Up.—The patient should be kept in bed three full weeks. She may then be allowed out of bed gradually, each day more and more, so that by the end of the fourth week she is ready to leave the hospital. If the patient is allowed up too soon, there may be stretching of the newly-healed tissues and recurrence of the old trouble. It may seem strange that the patient is kept in bed longer than for an abdominal section, but there is good reason for it. So much strain comes on the pelvic sling as soon as the patient assumes the upright posture, that stretching of the repaired sling is very likely to take place unless the scar-tissue has had time to become firm.

j. General after-care.—It is a good plan to take advantage of the patient's confinement to bed to improve her general health. Many of these patients are weak, anemic, nervous and generally "run down," as a result of the long continued pelvic distress. In such a case, after the first three or four days, put the patient on a good tonic, containing iron and such additional drugs as may be indicated in the particular case. The patient may be given large quantities of milk in addition to the other food, both at regular meal times and between meals and at night, the amount of nourishment taken each twenty-four hours being gradually increased as the patient can bear it.

In many cases it is of much benefit to employ massage, passive movements, salt-rubs and the various other measures used in the "rest cure" for neurasthenia.

The tonics should in most cases be continued two or three months after the patient leaves the bed. The bowels must be regulated by laxatives so there will be no straining. Heavy lifting must be avoided. Sexual intercourse should be postponed for at least one month after the patient is up and about.

COLPOCELE, RECTOCELE, CYSTOCELE

In many cases of laceration of the pelvic floor, there is considerable protrusion of the vaginal walls, constituting **colpocele.** It may be the posterior vaginal wall (posterior colpocele) or it may be the anterior vaginal (anterior colpocele).

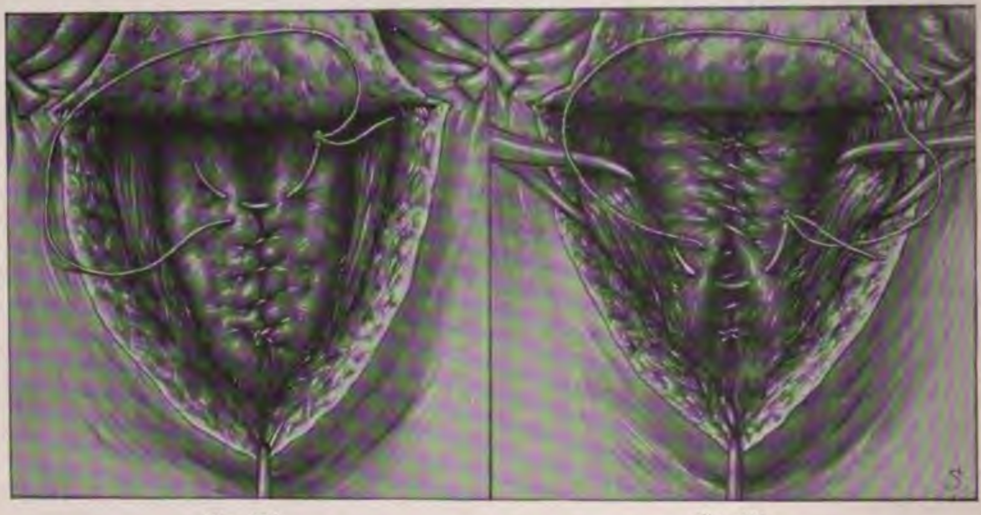


Fig. 405. Fig. 406.

Figs. 405 and 406.—Special sutures for rectocele. Fig. 405 shows method of placing the first row of sutures for turning in the redundant rectal wall. Fig. 406 shows the first row completed and the second row being passed.

If the rectal wall follows the prolapsing posterior vaginal wall, the condition is called **rectocele** (Figs. 371, 372, 373, 374, 375). Rectocele is, of course, corrected by the regular repair of the pelvic floor.

If the bladder follows the prolapsing anterior vaginal wall, the condition is called **cystocele** (Figs. 371, 372, 376, 377). Cystocele, when present, requires a special operative measure for its cure, hence it is necessary to give it some particular consideration.

Rectocele

A moderate rectocele is taken care of by the regular repair of the pelvic floor. A marked retocele requires special suturing. The vaginal flap is separated very high—in some cases two-thirds of the distance to the cervix uteri.

Then, before the deep muscular sutures are passed, the anterior rectal wall is folded in by two or three rows of buried sutures as indicated in Figs. 405 and 406. After that the pelvic sling is shortened by the usual subvaginal approximation.

Cystocele

Cystocele of the most severe type occurs in conjunction with prolapse of the uterus, and its correction constitutes one of the important features in operation for prolapse. In fact, in many of the severe cases the most important problem is the permanent correction of the cystocele, the correction of the uterine prolapse being only incidental. This is evident from a study of the various effective operations for severe prolapse. The treatment for severe cystocele, therefore, will be found in Chapter VII.

Cystocele of moderate degree, not complicated by uterine prolapse or retrodisplacement, may be corrected by simple repair of the utero-pubic fascia followed by repair of the pelvic floor. This work through the anterior vaginal wall is often referred to as anterior "colporrhaphy," but it should go much deeper than suture of the vaginal wall. It should bring together the deep fascial structures, as shown in Figs. 409 and 410. The steps in the work are as follows:

1. *Incision through the anterior vaginal wall.*—This extends from the vaginal entrance backward to the cervix uteri (Fig. 407). To make the wall tense to facilitate incision, it is caught at the anterior and posterior ends of the intended incision with tenaculum forceps. The posterior tenaculum forceps is placed just in front of the cervix, which it pushes backward and downward in the pelvis, in order to make tense the anterior vaginal wall.

It is important in these cases to avoid the common practice of drawing the cervix outside the vagina. There is no marked uterine prolapse or retrodisplacement in the cases under consideration; and if, to correct the moderate cystocele the cervix is drawn outside the vaginal entrance, the uterosacral ligament and broad ligaments are overstretched and the patient is in worse condition at the close of the operation than she was at its beginning. The overstretched uterine supports will probably, sooner or later, permit retrodisplacement and prolapse. Of course, where there is already marked prolapse, no harm results from drawing the cervix outside the vagina for work on the uteropubic fascia; for the ligaments are already relaxed and the relaxation is taken care of in the subsequent steps of the prolapse operation. It is quite different, however, in the cases under consideration, in which no prolapse is present. Here, the posterior supporting ligaments of the cervix uteri are intact, and it is important to preserve them intact even though such preservation makes the work decidedly more inconvenient.

The same error (drawing the cervix too far forward) is frequently made in doing a simple curettage—the overstretching of the uterosacral and broad ligaments leading to subsequent retrodisplacement as explained in Chapter VI.

2. *Separation of the vaginal wall from the underlying tissues.*—The margin of the flap is freed by scissors or knife. It is then grasped with a forceps and

the underlying tissues rolled off with the gauze-covered finger (Fig. 408). When both flaps have been well separated, the excess of vaginal wall is trimmed away (Fig. 410), leaving just enough to meet in the median line over the repaired fascia. If preferred, the trimming of the vaginal flaps may be delayed until after the fascial repair.

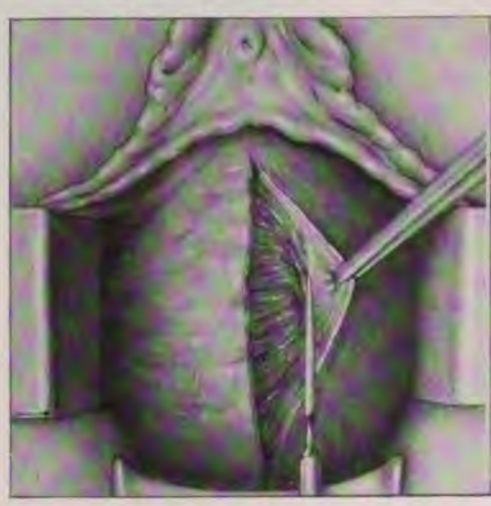


Fig. 407.—Incision for cystocele operation. This extends along the anterior vaginal wall from the vaginal entrance to the cervix uteri.

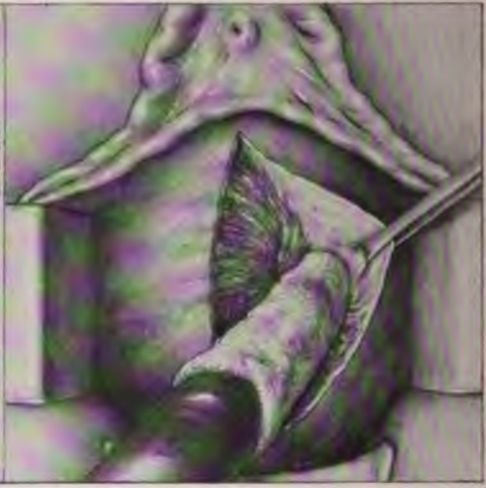


Fig. 408.—The vaginal flap on either side is pushed off from the underlying tissues by means of the finger covered with gauze.

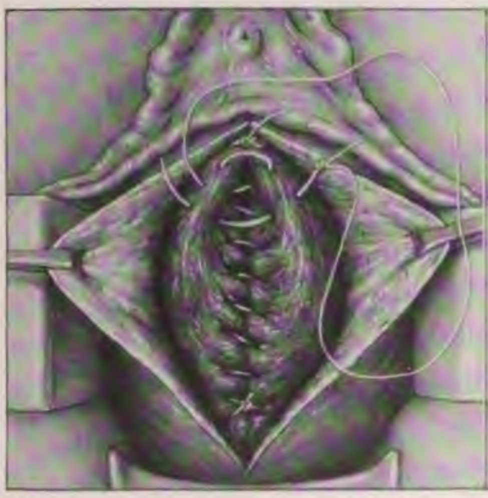


Fig. 409.—The first row of buried sutures, approximating the deep tissues (utero-pubic fascial plane) is finished, and second row is started.

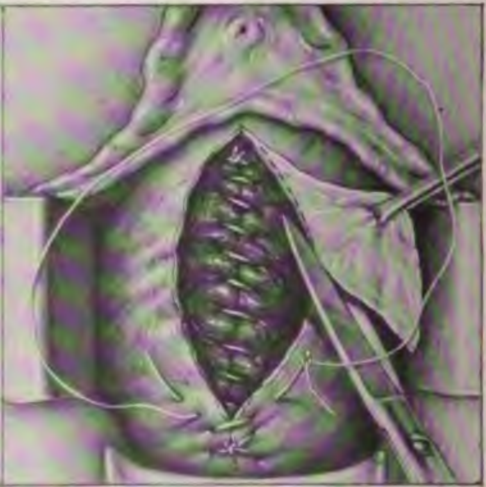


Fig. 410.—After finishing the second row, the excess of vaginal wall is trimmed away and the wound closed.

3. *Shortening of the uteropubic fascial plane transversely* is accomplished by two or three rows of buried sutures as indicated in Figs. 409 and 410. The greater the relaxation, the more rows of sutures required. Sufficient sutures should be passed to take up the slack and form a firm side-to-side supporting sling beneath the bladder.

The tissues of the uteropubic fascial plane are rolled off the vaginal flap with the bladder. They remain attached to the bladder wall, and the plication of the plane, as here carried out, consists in turning in and suturing this apparently thickened bladder wall—that is, the fascial plane and the bladder wall are manipulated together. On the other hand, in those very severe cases associated with uterine prolapse, where it is necessary to separate the bladder entirely from the uterus, there is more or less separation of the bladder from the uteropubic plane, particularly in its posterior half.

4. *Closure of the vaginal wound* is accomplished by a running suture, as indicated in Fig. 410. The suture is of chromic catgut and should be securely locked at intervals. If preferred, the suture may be half-locked all the way. The half-locked suture is an excellent one where there is bleeding from the edges.

It is usually more convenient to begin the closing suture at the posterior end of the wound, and finish at the anterior end, as shown in the illustration.

RECTOVAGINAL FISTULA

From injuries in labor or from destructive ulceration or from other causes, fistulous openings may form, extending in various directions. The different varieties of genital fistulae, with the name given to each, are shown in Fig. 411.

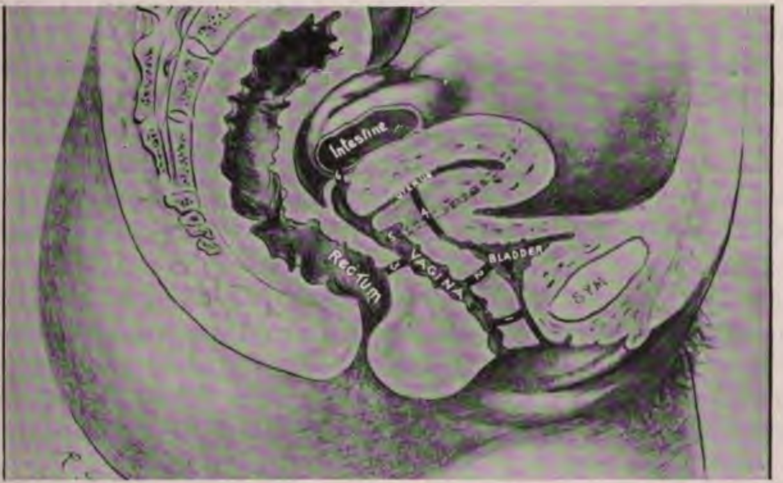


Fig. 411.—Fistulae of the genital tract. *1.* Urethrovaginal fistula. *2.* Vesicovaginal fistula. *3.* Rectovaginal fistula. *4.* Vesicouterine fistula. *5.* Ureterovaginal fistula. *6.* Intestinovaginal fistula. (Gilliam—*Practical Gynecology.*)

A Rectovaginal Fistula is an opening from the rectum into the vagina. The size of the fistula may vary from a small tortuous tract, admitting only a small probe and permitting only gas or fluid to escape, to a large opening, involving a large part of the rectovaginal septum, and through which pass practically all the rectal contents.

Etiology and Pathology

The following are the causes of rectovaginal fistulae:

1. **Injuries in Labor.**—In rare cases a hole may be torn through the rectovaginal septum, resulting directly in a fistula. Usually, however, a fistula resulting from labor is due to a complete laceration of the perineum, which is repaired at once or later, but fails to heal entirely. The lower part of the approximated surfaces unites, but a small part of the upper angle fails to heal, and the result is a fistula extending from the rectum into the vagina.

2. **Chronic Ulceration** of the posterior vaginal wall, which may be chancroidal or syphilitic or tuberculous. It usually affects the lower part of the vagina.

3. **Stricture of the Rectum**, with dilatation and ulceration of the rectal wall above it.

4. **Malignant Disease** of the rectovaginal septum is usually secondary to cancer of the cervix uteri or cancer of the rectum.

5. **Operation.**—A pelvic abscess which has ruptured into the rectum, will, if opened into from the vagina, give a rectovaginal fistula. Again, in stricture of the rectum, there may be dilatation and ulceration of the rectal wall above the stricture with periproctal inflammation and an abscess. Such an abscess, if opened into from the vagina, will give a rectovaginal fistula. Again, the rectal wall may be injured directly in various operations.

Diagnosis

The diagnostic symptoms of rectovaginal fistula are the escape of some of the rectal contents into the vagina and the vaginal irritation caused by the same. The amount and character of the leakage from the rectum varies much in different cases. In the smallest fistulae, only gas with occasionally some liquid passes. With the opening a little larger, there may be free leakage only when the bowels are loose and the contents fluid. In still other cases, nearly all the rectal contents, whether fluid or solid, pass through the fistulous opening.

Digital examination reveals a rough place in the posterior vaginal wall. If the opening is small, only a small elevation or depression or a rough place, is felt. On inspection, if the opening is large it may be seen; but if small, only a rough place with a small slit is visible. Very often a red papule marks the vaginal opening of the fistula. Exploration of the opening with a probe, with a finger of the other hand in the rectum, shows that the sinus communicates with the rectum. In a doubtful case in which the opening cannot be found or in which a probe [illegible] whether there is a rectovaginal fistula may be established and its location determined by injecting colored water (methylene blue, [illegible]) into the rectum and watching for its appearance [illegible]. If there is syphilitic or chancroidal or tuberculous ulceration, or if there is a stricture of the rectum or malignant disease, [illegible] underlying disease will be present [illegible]

Treatment

In the rectovaginal fistula following labor, that is, where part of the repaired rectovaginal septum failed to heal, no secondary operation should be undertaken for the closure of the fistula for six or eight weeks after labor. The fistula may close spontaneously within a few weeks. Again, an operation in the genital tract in the puerperium increases the chances of puerperal sepsis. Also, the patient is later in much better condition generally for the operation, as she has recovered from the debilitating effects of parturition. Locally, also, the tissues have returned to their normal condition, and complete primary union is much more certain to follow the operation. For some time following labor the uterine discharge would tend to interfere with healing and the tissues are so friable that the sutures are much more liable to cut through.

Palliative Treatment.—In the meantime, the vagina must be kept clean by antiseptic vaginal douches, once, twice or three times daily, as indicated by the amount of leakage through the opening. If the opening is very small, stimulation by touching it occasionally with silver nitrate stick or with carbolic acid, will sometimes cause the fistula to close. If the fistula persists after thorough recovery from the parturition, it may be closed by operation.

Operation.—In the simple form of fistula, without complicating ulceration or infiltration, the operation for closure may be undertaken without special local preparatory treatment.

The **preparation** of the patient, operator, instruments and dressings is the same as for repair of complete laceration of the pelvic floor.

Steps.—The patient is placed in the dorsal posture and the fistula exposed by retractors or by the fingers of an assistant as is found most convenient. The sphincter ani muscle should be temporarily paralyzed by **stretching** before beginning the operation proper.

The vicinity of the fistula is then **denuded** as shown in Fig. 412, for vesicovaginal fistula. The denudation may be made with scissors or knife, as found most convenient. This removes all scar-tissue along the fistulous tract and gives healthy denuded tissue for approximation. A large area should be denuded on the vaginal surface, and this as it goes deeper should slant gradually toward the point at which the fistula enters the rectum.

The opening in the rectum should not be made larger than is absolutely necessary to remove the hard scar-tissue from the opening and to denude the edges of the rectal mucosa, so that when these edges are brought together union will take place.

After denudation the opening is closed by sutures as indicated in Figs. 412 and 413. It is important that no sutures penetrate to the rectal cavity. It is well to use fine linen or silk for the suturing.

When there is a large opening into the rectum, it may be necessary to close the opening in the rectal mucosa with a **separate row** of sutures passed from the rectal surface and tied in the rectum. In order to do this, it is necessary to dilate the sphincter ani widely so that the rectal end of the fistula may be reached for suturing. The denudation is made the same as previously described. The rectal sutures include only the rectal mucosa and a small amount of submucous tissue. After the opening in the rectal mucosa has been closed, the remainder of the wound is closed by sutures from the vaginal surface as already described.

In a case of large fistulous opening near the anus, better approximation can be secured by dividing the tissues between the fistula and the anus, thus converting the fistula into a **complete laceration** of the perineum, which is then repaired in the ordinary way.

The **after-treatment.** The after-treatment of a case of rectovaginal fistula is the same as after repair of complete laceration of the pelvic floor.

Special Measures.—In some cases there has been so much loss of tissue that the sides of the opening cannot be satisfactorily approximated. This marked loss of tissue may be due to extensive ulceration at the time the fistula was formed, or to repeated attempts at repair. In either case the vicinity of the opening is occupied by scar-tissue, extending in various directions and making the parts so rigid that the opening cannot be satisfactorily closed except by the employment of one of the following special measures:

1. Incisions of the vaginal mucous membrane some distance from the opening, to permit the mucosa being drawn over the opening without injurious tension. Each of these incisions, if made short, may be closed immediately by passing a suture in the long axis of the incision.

2. Transplantation of a flap of vaginal mucous membrane, the flap to receive its nourishment through an unsevered portion at one or both ends.

3. Detachment of the rectum from the fixed vagina, by incision in the perineum, and closure of the rectal wall independently of the vaginal wall. In certain cases of large rectovaginal opening, the vaginal wall is bound immovably by scar-tissue and the sides of the rectal opening are likewise held apart by their attachment to the vaginal wall. If a transverse incision be made in the perineum and the rectal wall dissected from the vaginal to a considerable distance above the fistula, it then becomes freely movable and the sides of the opening may be approximated. They should be united by one or two rows of sutures. The sutures may be passed from the opening in the vaginal wall from the perineal wound, as found most convenient.

If the fistula is complicated by ulceration, the ulceration, of whatever character, should be healed as far as possible before the attempt is made to close the fistula. In some of these cases, the patient has tertiary syphilis and needs a prolonged course of treatment for the ulceration and for the syphilitic deposit, and also for the marked anemia and generally lowered vitality that accompanies that disease.

In the syphilitic cases, if closure is attempted while the ulceration is still present or while the patient is anemic and weak from ulceration elsewhere, the operation is very liable to result in failure and the last opening may be larger than the first.

In a tuberculous fistula and in a malignant fistula, it is useless to attempt closure of the fistula unless the infiltrated area can be excised and healthy tissue approximated by the sutures.

Other Fecal Fistulae

Occasionally there occur other varieties of fecal fistula, opening into the genital tract. There may be an opening into the vagina from the sigmoid flexure or from the colon or from the small intestine. There may be an opening into the uterus from the sigmoid or from the colon or from the small intestine.

The most common form is that following some operation at the vaginal vault, particularly vaginal hysterectomy. It appears in the form of a small opening in the scar at the vaginal vault, from which intestinal gas or fluid escapes. It is caused by injury of the intestine during operation or by ulceration of the intestinal wall before or after operation. The injury may be caused by a bite of the bowel by the tip of the pressure forceps, by a puncture of the bowel by a needle or ligature carrier, by inclusion of a small portion of the bowel in a ligature as it is being tied or by partial or complete rupture of the bowel in breaking up adhesions. Sometimes a tubal abscess is discharging into the large or small intestine and, when such an abscess cavity is opened by vaginal incision, a fecal fistula results.

Fecal fistulae involving the vault of the vagina often close spontaneously after a few weeks, the vagina in the meantime being kept clean by antiseptic douches.

If the fistula persists after several weeks with no apparent prospect of closing it will be necessary to close it by operation involving abdominal section or vaginal section. The character of the operation required will depend on the character of the fistula. It should be undertaken only by one skilled in pelvic surgery for conditions very difficult to handle may be encountered.

The other forms of genitointestinal fistula are rare, so rare that they are curiosities. They are due to special causes and require special treatment, usually involving abdominal section.

VESICOVAGINAL FISTULA

There may be an opening between the genital tract and the urinary tract at one of several situations (Fig. 411). The location is indicated by the name as follows:

Urethrovaginal Fistula—Between Urethra and Vagina.
Vesicovaginal Fistula—Between Bladder and Vagina.
Urethrovaginal Fistula—Between Ureter and Vagina.
Vesicouterine Fistula—Between Bladder and Uterus.
Ureterouterine Fistula—Between Ureter and Uterus.

All of these fistulae are rare, the most common being the vesicovaginal. A **vesicovaginal** fistula is an opening from the bladder into the vagina. The size of the fistula may vary from a small opening, permitting only slight leakage, to a large opening through which all the urine passes.

Etiology

The following are the causes of the vesicovaginal fistula:

1. **Injuries in Labor.**—In prolonged labor where the lower portion of the bladder is caught and held for several hours between the head and the pubic bone, sloughing may follow. Part of the base of the bladder and the anterior vaginal wall are bruised, the circulation is more or less cut off, the parts become gangrenous and after a few days the slough separates, leaving a vesicovaginal opening through which the urine passes. Such injuries are rare in recent years on account of the great improvement in obstetric teaching and practice. Now, the head is not permitted to remain for several hours in such a position that it makes serious pressure on the bladder. If the head does not advance satisfactorily within a reasonable time after the rupture of the membranes, the child is delivered by forceps or otherwise.

A still rarer form of damage to the bladder in labor is that in which the bladder is torn directly, either by the manipulations incident to a version or by the forceps. In that case the dribbling of urine is noticed immediately, or within a few hours after labor, whereas if the fistula is due to sloughing, there is no escape of urine until the separation of the slough, which requires several days.

2. **Chronic Ulceration** of the anterior vaginal wall or the base of the bladder. The ulceration may be chancroidal, syphilitic or tuberculous.

3. **Malignant Disease** of the vesicovaginal septum is usually secondary to cancer of the cervix uteri.

4. **Operations.**—One of the methods of treating severe chronic cystitis is to make an opening from the vagina into the base of the bladder, so as to give constant drainage of the latter. Such an opening usually closes spontaneously a short time after the drainage tube is removed. It may, however, fail to close promptly after its usefulness is ended, and in that case becomes a vesicovaginal fistula, requiring operation.

Diagnosis

The patient complains of urine coming from the vagina and of much vaginal irritation. In some cases the patient complains simply that she cannot control the urine.

Digital examination reveals a rough place on the anterior vaginal wall. If the opening is large it may be distinctly made out with the finger. If the opening is small, only a slight elevation or depression or rough place may be felt. Upon inspection, if the opening is large, it may be seen, but if it is small, only a rough place with a small slit is visible. Very often a red papule marks the vaginal opening of the fistula. Exploration of the opening with a probe, with a sound in the bladder, shows that the sinus communicates with the bladder. If the opening be watched a few minutes, urine may be seen escaping from it. If the diagnosis is doubtful, sterile methylene-blue solution may be injected into the bladder and its appearance watched for at the supposed vaginal opening of the fistula. There is a rare condition which must be carefully differentiated from vesicovaginal fistula, namely, ureterovaginal fistula.

When the vesicovaginal opening is large, the fact that it communicates with the bladder is apparent, and frequently the margins of the opening and the adjacent surfaces of the vaginal mucosa and vesical mucosa are encrusted with the phosphates from the decomposed urine. In one of the author's cases there was a large phosphate stone nearly filling the contracted bladder and projecting through the large vesicovaginal opening into the vagina.

The irritation caused by the decomposition of urine in the vagina is very great, and the constant odor of decomposing urine combined with the constant leakage of fluid, soaking pads and clothing, makes the patient's very existence a burden to her.

Treatment

If the fistula is due to malignant disease, no attempt should be made to close it unless the malignant infiltration is so situated that it can be completely extirpated. In the inoperable cases, local cleanliness and local sedatives are indicated.

If the fistula has resulted from sloughing after labor, it is best to postpone the operation for repair for at least eight weeks, until the patient has fully recovered from parturition and the tissues have become strong enough to hold the sutures well. During the time the patient is waiting, palliative treatment will be necessary.

Palliative Treatment consists in keeping the parts clean and in receiving and disposing of the urine, so that it does not come in contact with the clothing. To accomplish the first object, a urinary antiseptic such as urotropin should be given internally. Also a vaginal douche of borax (a tablespoonful to a quart of water) or a weak carbolic douche (½ per cent) should be given two or three times daily and the external genitals should be washed frequently with a carbolic wash. If there is much vulvar irritation, the measures mentioned under acute vulvitis may be employed. For catching the urine and protecting the clothing, one of the urinals found in the instrument stores may be used. If no satisfactory urinal can be obtained, an absorbent cotton pad covered with a large piece of rubber sheeting may be used. The piece of rubber sheeting is held in place by a suitable bandage and the pad is changed as frequently as it becomes wet, so that no leakage into the clothing takes place. All the surfaces with which the urine comes in contact may be coated twice daily with benzoated zinc-oxide ointment.

If the fistula is very small, cauterization may aid spontaneous closure. The vaginal portion of the fistulous tract may be cocainized and then touched with carbolic acid or nitric acid. An occasional stimulation with the silver nitrate stick is sometimes useful. If after the patient has recovered from parturition, the fistula shows no evidence of early closing, an operation is indicated.

Operation

In an operative case of vesicovaginal fistula the **preparatory measures** are important. The object is to secure a healthy condition of the edges of the fistulous opening. These edges are often inflamed and covered with phosphatic deposits. These deposits should be removed with cotton and the raw surfaces brushed with silver nitrate solution (2 per cent to 4 per cent) or some of the other silver preparations. If the deposits adhere to the mucous membrane and are difficult to remove, they may be dissolved by the application of a weak nitric acid solution (one or two drops to the ounce). Frequent hot vaginal douches of plain water or borax solution or weak carbolic solution, are beneficial, as are also frequent warm sitz-baths. After the douches and sitz-baths the patient should dry the parts as best she can and then apply the zinc oxide ointment over all the surfaces, to prevent contact with the urine.

Every second or third day the physician may introduce the Sims speculum, cleanse the parts thoroughly, apply the silver preparation and then coat the vaginal walls and adjacent surfaces with benzoated zinc oxide ointment or other suitable protective.

The urine may be made more acid and the tendency to phosphatic deposits thus diminished, by giving the benzoic acid mixture recommended by Emmet. After a few days, when the urine is strongly acid and shows but little tendency to decomposition, the dose of the benzoic acid mixture may be reduced from a tablespoonful to a teaspoonful, as the larger dose may produce gastric irritability. This urinary antiseptic or some similar one should be continued after operation to prevent phosphatic deposit about the bladder wound. Also, a large amount of pure water should be given to keep the urine well diluted.

The same general preparation of the patient for operation should be carried out as for repair of laceration of the pelvic floor. Special attention must be given the urine. For several days before operation the patient should be given some urinary antiseptic every six or eight hours, such as the benzoic acid mixture, just mentioned, or cystogen or urotropin or salol and boric acid.

A specimen of urine for analysis may be obtained by cleansing the vagina and then placing a bed-pan under the patient long enough to collect a sufficient quantity.

Before operation it must be determined that the urethra is not closed by shrinkage from non-use and inflammatory adhesions. In some cases no urine has passed through the urethra for months or years. If the urethra is not of proper caliber it should be dilated during the preparatory treatment.

The **technic** of the operation for vesicovaginal fistulae is indissolubly connected with the name of J. Marion Sims. The rise of Sims to great prominence was due largely to his admirable work in these cases. Up to his time the severer grades of vesicovaginal fistula were considered incurable, and every such patient was consigned to lifelong misery, a burden to herself and to her associates. Extensive vesicovaginal fistula following labor was much more common then than it is now, for obstetric teaching had not then advanced to its present state. Consequently there were many patients in the various countries of the world suffering from the severer forms of this trouble, and all were practically without hope of relief.

Sims took hold of the subject and perfected the means for exposing the fistula—Sims' speculum and Sims' posture—and also the instruments and technic for suturing with silver wire. He also provided for constant drainage of the bladder during healing, by the use of a retention catheter.

These improvements together with his tactile skill, his painstaking care and his courageous perseverance, enabled him to obtain results that were before considered impossible. Apparently hopeless cases were made well, patients were restored from a miserable existence to a happy life and eventually the fame of Sims spread everywhere in the civilized world—and history justly records him as one of the great leaders in medical progress and one of the great benefactors of mankind. He made many other advances in the treatment of diseases of women, but none so striking and complete as in vesicovaginal fistula. The silver wire sutures and the instruments used by Sims in their application, still hold their place with some operators, though most operators now prefer the buried silk or linen or chromic catgut sutures. In some cases the Sims posture and the Sims speculum give the best exposure of the field for operation, but in most cases the operation can be more quickly and satisfactorily carried out with the patient in the exaggerated lithotomy posture, otherwise known as the Simon posture.

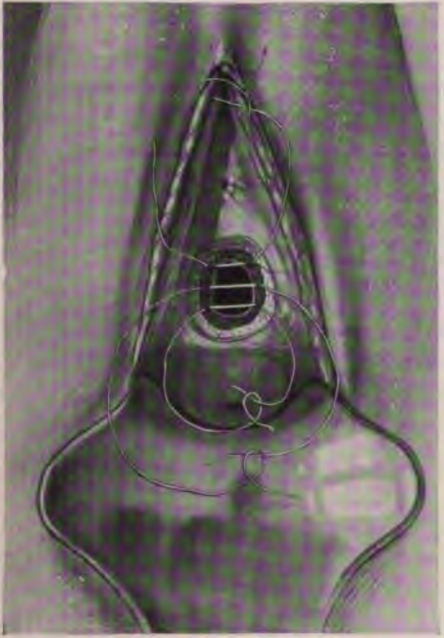


Fig. 412.—The regular operation for vesicovaginal fistula. Showing the area of denudation and also the deep sutures. (Montgomery—*Practical Gynecology*.)

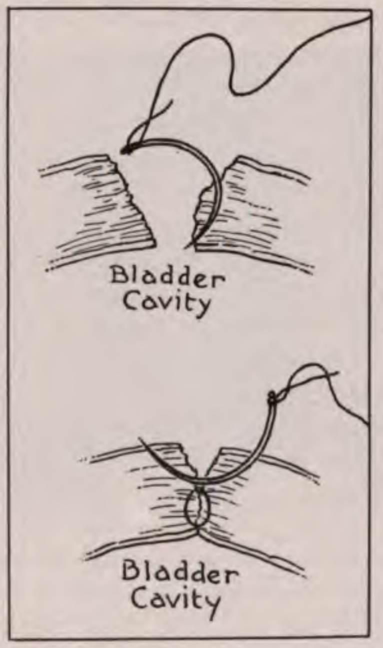


Fig. 413.—Method of suturing vesicovaginal fistula or rectovaginal fistula. Notice that the walls are approximated in layers and that the needle does not penetrate the mucosa of the hollow organ opening into the vagina.

Steps.—After satisfactory **exposure** of the fistulous opening, the edges are **pared** as shown in Fig. 412. A small, sharp knife or curved scissors may be used, as found most convenient. A very good plan is to outline the area to be denuded with a knife, so as to give it an even margin, and then excise the tissue with the scissors. The denudation is made extensive on the vaginal surface and slopes inward toward the bladder opening. The denudation must be carried into sound tissue so that primary union may take place.

When possible the denudation should be made in such a way that the line of union can be made to lie somewhat in the long axis of the vagina. That is preferable for the reason that it causes less disturbance of the pelvic relations. When the line of union extends crosswise of the vagina, the anteroposterior tension tends to drag the cervix downward and cause retroversion. The fistula should be closed, however, in the way that will permit accurate approximation without injurious tension. In case the opening is round, a V-shaped denudation may be made at each end to permit accurate approximation in a straight line without too much tension. If necessary the edges may be brought together in the shape of an X or a Y.

The oozing of blood may be largely checked by the application of a small cotton or gauze sponge wrung out of very hot water, or by irrigating with hot water. The denudation should not extend into the vesicle mucosa as it may start bleeding, that may continue to prove troublesome even after the sutures are passed and tied. In some cases, after such operation, blood clots have formed in the bladder to such an extent that the wound had to be reopened.

The **sutures** are passed as shown in Figs. 412 and 413. They do not appear on the vesical surface.

The sutures are passed at intervals of about one-fourth of an inch. They may consist of silk or linen or of 20-day catgut. After the sutures are passed the bladder should be washed out before they are tied, to wash out all blood from it. The sutures are then tied and cut, and, if desired, the bladder may be filled with boric acid solution (3 per cent) to see whether there is any leakage.

A very useful expedient, especially when there is much loss of tissue and decided tension in bringing the sides together, is to incise the vaginal surface around the fistula, as shown in Fig. 414, and then turn in the edges without cutting any off. The raw surfaces of the turned-in flaps are sutured together by buried sutures (Fig. 415) and then the vaginal mucosa is closed over by continuous or interrupted suture as desired (Fig. 415).

After the fistula is sutured, a light packing of antiseptic gauze is placed in the vagina, the soft rubber retention catheter is introduced, if it is to be used, a dressing is applied over the vulva and the patient is put to bed.

The **after-treatment** is the same as after repair of laceration of the pelvic floor, with the addition of frequent catheterization or constant bladder drainage by means of the retention catheter. When the retention catheter is used, it is left in from three to eight days, depending on the case, and after that the patient urinates or is catheterized every six hours until the wound is firmly healed.

If preferred, the bladder may be emptied by catheter every three to six hours for the first two or three days, the retention catheter being thus entirely dispensed with. With a reliable trained nurse in attendance, the frequent catheterization is fairly safe, but without such an attendant, the retention catheter is safer. When it is used, it should be removed and sterilized each day and the bladder washed out with boric acid solution (3 per cent). It is well to leave the catheter out for an hour or two for a change. As long as catheterization is necessary, the bladder should be washed out with boric acid solution (3 per cent) either once or twice daily or after each catheterization. When the retention catheter is in place, the patient may lie in the prone or semiprone posture to favor drainage. In severe cases it may be advisable to keep her in this posture most of the time, until the opening is healed.

In mild cases, no special care is necessary except to administer the urinary antiseptic and to see that the bladder is emptied every four to six hours, either spontaneously or by catheter.

The sutures are removed in twelve to fifteen days.

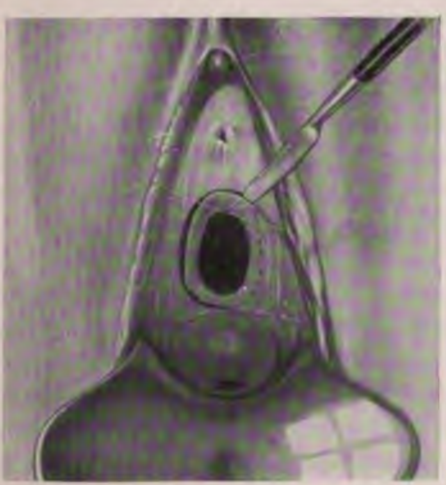


Fig. 414.—The flap operation for vesicovaginal fistula. Making the incision for turning in the flap. The "flap operation" is especially useful where there has been loss of tissue. (Montgomery—*Practical Gynecology*.)

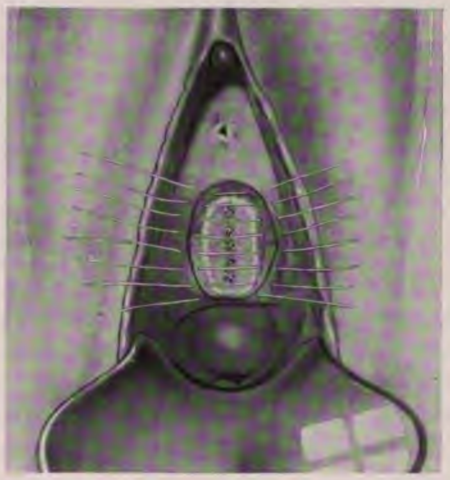


Fig. 415.—The flap operation for vesicovaginal fistula. The flap has been turned in and the deep sutures passed and tied. The superficial sutures also are in place. If preferred, continuous sutures may be used throughout. (Montgomery—*Practical Gynecology*.)

Special Measures.—There are various special measures required by special conditions.

In cases in which there are bands of scar-tissue in the vagina, which hold the edges of the fistula apart, it is sometimes advantageous to divide these bands in the preliminary treatment, and separate the divided bands widely by a glass plug.

In severe cases, there is danger of occlusion of a ureter, by a ligature or by an opposing surface. This accident is indicated by increasing pain in the region of one kidney and along the ureter, accompanied by a decided diminution in the amount of urine secreted. It requires the removal of one or more sutures. To prevent occlusion of the ureter a cystoscopic examination should be made whenever the position of the fistula is such as to make it probable that one of the ureters enters it or lies close to it. By cystoscopic examination, the ureteral opening may be located and, if it is dangerously near the fistula, a ureteral catheter may be introduced, that the ureter may be better located during the operation and avoided.

In the severer cases, where there is much loss of tissue and scar contraction, it may be necessary to employ one or more of the special measures mentioned under rectovaginal fistula, such as remote incisions of the vaginal mucous membrane or transplantation of flaps of the mucosa. There are other special measures that are useful in certain cases, such as the following:

a. Separation of the bladder wall from the uterus and upper part of the vagina, sufficiently to permit its being pulled down and sutured to the lower edge of the opening without much tension.

b. Drainage of the bladder by suprapubic cystotomy. Satisfactory drainage can usually be secured with a retention catheter in the urethra. In certain cases, however, the neck of the bladder, and consequently part of the urethra, is in the damaged area and is necessarily involved in the operative work. In such a case, if a catheter be left in the urethra, the tissues in the neck of the bladder immediately about the catheter, fail to heal, resulting in incontinence of urine. In such a case, the bladder may be drained and kept at rest by suprapubic cystotomy and constant drainage. Another method of dealing with these cases is to make the operation in two stages—repairing first the urethral injury and draining the bladder by the fistula, and later closing the fistula and using the urethra for drainage.

The **difficulties** of operation vary much in different cases. A small vesicovaginal fistula is easily repaired and usually heals without trouble. In the case of a large fistula in which the edges can be easily brought together with tenacula, or can be brought so near together that lateral incisions will permit perfect approximation, there is but little difficulty for an experienced operator. It requires considerable experience in plastic surgery to be able to judge in some cases before an operation whether or not such approximation can be secured. If it cannot be secured some other measure must be adopted and planned for in detail, before the day of operation.

In some cases, with the best of care, two or three operations may be required to effect a cure, the fistulous opening being decidedly reduced in size with each operation. But the operator must have a clear understanding of what is to be accomplished in that particular case by each operation. As Kelly remarks in his admirable work, "It is worse than useless to denude the edges of a large fistula without having any definite idea of what can be accomplished [illegible] It would be far better [illegible] an inability to [illegible] increasing the size of the fistula [illegible] some chance the operation was started."

There are cases of [illegible] contracted bladder and with scar [illegible] edges of the fistula [illegible] and ingenuity of the operator [illegible] urinary stream within control of the sphincter vesicae and of providing a bladder-cavity large enough to hold a few hours' urine.

Other Urinary Fistulae

Occasionally there occur other varieties of urinary fistulae, opening into the genital tract. There may be an opening into the vagina from the ureter of one or both sides, or there may be an opening into the cervix uteri from the bladder or from the ureter.

The usual causes of these fistulae are severe laceration of the cervix in labor or some operation at the vaginal vault. The fistula appears as a small opening in the scar-tissue, from which urine escapes. If due to injury during operation, the injury may have been caused by a tear of the bladder wall while separating it from the uterus, by a bite of a ureter or the bladder by the tip of a pressure forceps, by a puncture of a ureter or the bladder by a ligature carrier, or by inclusion of a ureter in a ligature.

When due to an injury during labor, the vesicouterine fistula is caused by a severe laceration of the cervix extending up into the vaginal vault and through the bladder wall. The lower portion of the cervical wound heals, but the upper part communicating with the bladder fails to heal, and there is left an opening from the bladder into the cervical canal.

In the ureteral fistula, if one ureter only is involved, there will be leaking of urine into the vagina and at the same time urine from the other ureter will be received and contained in the bladder and passed normally. If both ureters are involved, all the urine will pass into the vagina and none into the bladder. In either case, if methylene-blue solution be injected into the bladder, none of it will pass through into the vagina. When the fistula is connected with a ureter, the urine comes in little gushes at intervals of several seconds.

The vesicouterine and ureterouterine fistulae are indicated by the escape of urine from the cervical canal. Colored water injected into the bladder, comes out of the cervical canal, if the fistula is connected with the bladder, but not if it is connected with the ureter.

These fistulae at the vault of the vagina often close spontaneously after a few weeks, the vagina in the meantime being kept clean by frequent antiseptic douches. If a fistula persists after several weeks with no apparent prospect of closing, it will be necessary to close it by operation. Occasionally the fistula may be closed by a small operation, for example, in the vesicouterine fistula if the fistula is near the free margin of the cervix, the cervix may be split up to the fistula, the infiltrated margins of the fistula excised, and the whole area closed, much the same as an ordinary cervical laceration, with the addition of a few extra sutures for the bladder wall. If the fistulous tract is situated high in the cervix the operation will involve separation of the bladder from the uterus and separate closure of the two wounds. This may be carried out through vaginal dissection or by abdominal section, as found most convenient. The majority of fistulae at the vaginal vault require rather extensive operative procedures, vaginal or abdominal (depending upon the character and location of the fistula, and in most cases the procedures can be carried out satisfactorily only by one familiar with pelvic and abdominal operative work. Occasionally nephrectomy is advisable, to stop the continuous leakage of urine from a ureteral fistula that cannot be repaired.

Destruction of Urethra

The condition referred to here is destruction of the urethra by ulceration beginning in the vestibule and extending upward to the bladder. The urethra is destroyed as far as function is concerned and there remains simply an opening from the bladder to the external genitals, through which the urine constantly dribbles.

The destructive ulceration usually is syphilitic. The treatment is to restore the urethra by a plastic operation. The cases often prove very rebellious to operative treatment, it being particularly difficult to secure restoration of the sphincter function. The cause, course and effective treatment of this troublesome affection are given in detail in a paper* by the author, and also in his Operative Gynecology.

Partial Incontinence of Urine

Some patients complain of inability to control the urine when coughing, laughing, etc. In others the urine escapes when the bladder reaches a certain fullness. Patients past the menopause may find difficulty in retaining the urine when weakened by sickness or when very tired.

The incontinence is due to weakness of the sphincter vesicae. This weakness is due in most cases to stretching and injury at childbirth. The tissues in front of the vaginal opening are usually stretched considerably during childbirth and in some cases very much. Ordinarily this stretching is recovered from sufficiently to restore complete control, though the urethra is usually larger than before. In some cases the tone of the sphincter is not recovered and consequently there is not complete control of the urine. In some cases, though the tone is not fully recovered, the patient is able to control the urine, until the muscular atrophy of old age comes on. It is the latter factor that makes this of such frequent occurrence in the aged.

The treatment is to strengthen the sphincter vesicae. This is accomplished by excising a wedge-shaped piece of tissue in the region of the sphincter vesicae. This includes vaginal wall and underlying tissues but should not extend into the urethral canal. The tissues are then brought together and piled up by sutures, buried and otherwise. In many of these cases there is also cystocele and relaxed pelvic floor, both of which conditions should be thoroughly repaired, extra buried sutures being passed in the region of the sphincter vesicae. In inoperable cases, relief may sometimes be given by a specially adjusted pessary.

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*A Vesicovaginal Opening as a Means of Facilitating Difficult Plastic Work on the Urethra, by H. S. Crosser, M.D. American Journal of Obstetrics, [illegible]

CHAPTER VI

INFLAMMATORY AND NUTRITIVE DISEASES OF THE UTERUS

POINTS IN ANATOMY

The uterus is **situated** about the center of the pelvic cavity, between the bladder and the rectum (Figs. 1, 3, 534). It projects upward into the lower part of the peritoneal cavity, and its convex surface, except the lower portion, is enveloped by peritoneum. The upper end of the uterus is directed forward. The lower end is directed backward and downward and projects into the upper end of the vagina. The uterus is freely movable, especially the upper portion, and may be pushed backward by a full bladder or forward by a full rectum.

The uterus is **shaped** somewhat like an inverted pear (Figs. 416, 417, 418). Its lower constricted portion is called the cervix uteri (neck of the uterus) and to this the vagina is attached. The remainder of the organ is called the corpus uteri (body of the uterus). It is from the upper portion of the uterus, the widest portion, that the Fallopian tubes arise. That portion of the uterus lying above the Fallopian tubes is known as the fundus uteri (Fig. 418).

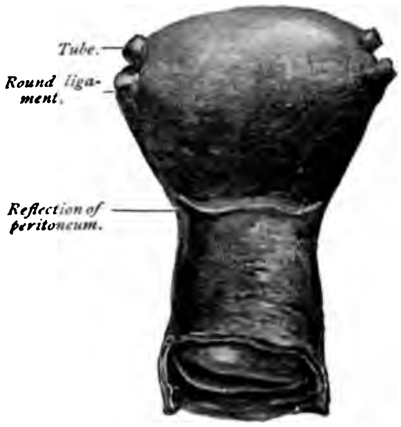


Fig. 416.—Anterior view of the uterus. (Dickinson—*American Textbook of Obstetrics.*)

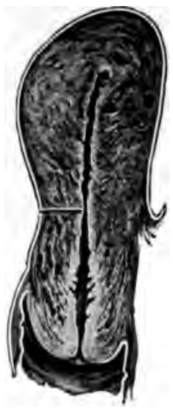
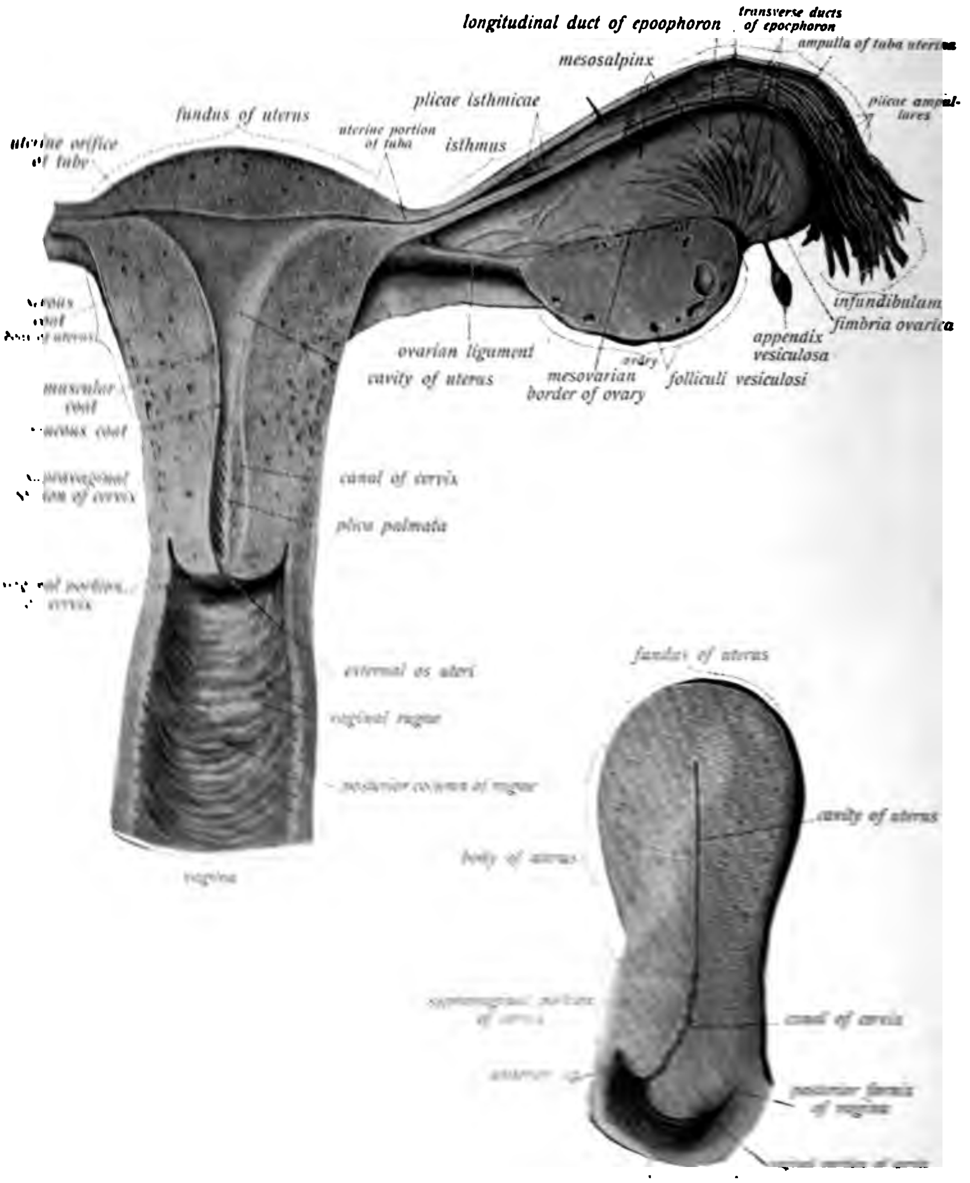


Fig. 417.—Anteroposterior section of uterus, showing walls and cavity. (Dickinson—*American Textbook of Obstetrics.*)

The uterus has a small central **cavity** (Figs. 418, 419) which is lined with mucous membrane and which communicates through the vagina with the outside world and through the fallopian tubes with the peritoneal cavity (Fig. 727). This is the only continuous opening from the outside of the body into the peritoneal sac, and it is because of this direct opening into the peritoneal cavity that peritonitis is so much more frequent in women than in men.

The **size** of the uterus is, of course, different in the different periods of life (Figs. 420, 421, 422). **At birth** it is a trifle over one inch long and the



[illegible] View from [illegible] Sobotta and [illegible]

[illegible] important to keep [illegible] an adult [illegible] troublesome symptoms due to lack of development. A rather common condition and a very troublesome one (see dysmenorrhea) is a sharp anteflexion of the cervix —the corpus uteri being in practically normal position, but the cervix being flexed sharply forward and directed along the vaginal canal toward the opening. In the fetus, the uterus lies very high and the cervix is very long. At first the axis of the cervix lies almost in the axis of the vagina, as shown in Fig. 423. Normally, as development progresses, the corpus uteri gradually comes forward and the cervix becomes directed somewhat backward, across the vaginal axis. In the cases of imperfect development above referred to, the corpus uteri comes forward normally but the cervix fails to assume its backward direction—remaining in practically the fetal position (directed along the axis of the vagina) and causing a sharp "anteflexion of the cervix" (Fig. 919).

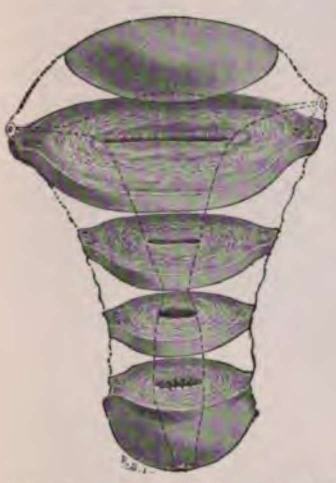


Fig. 419.—Reconstruction of the uterus, showing the shape of the cavity. (Williams—*Obstetrics.*)

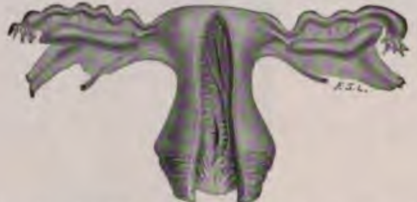


Fig. 420.—Uterus and appendages of a young child. (Williams—*Obstetrics.*)

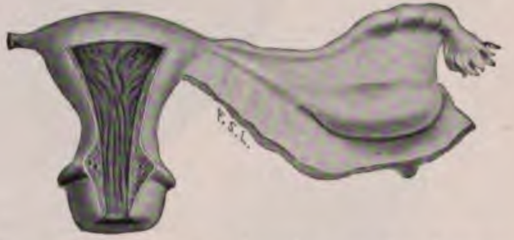


Fig. 421.—Uterus and tube and ovary of a fourteen-year-old girl. (Williams—*Obstetrics.*)

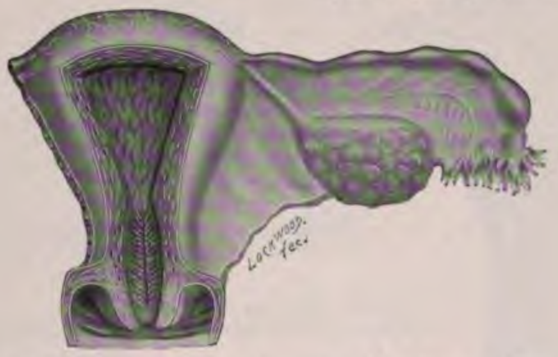


Fig. 422.—Uterus and tube and ovary of a twenty-year-old multipara. (Williams—*Obstetrics.*)

The **adult virgin** uterus is three inches long (cavity two and one-half inches) and the cervix forms one-third of the organ. The transverse measurement at the widest part is one and a half to two inches, and the average thick-

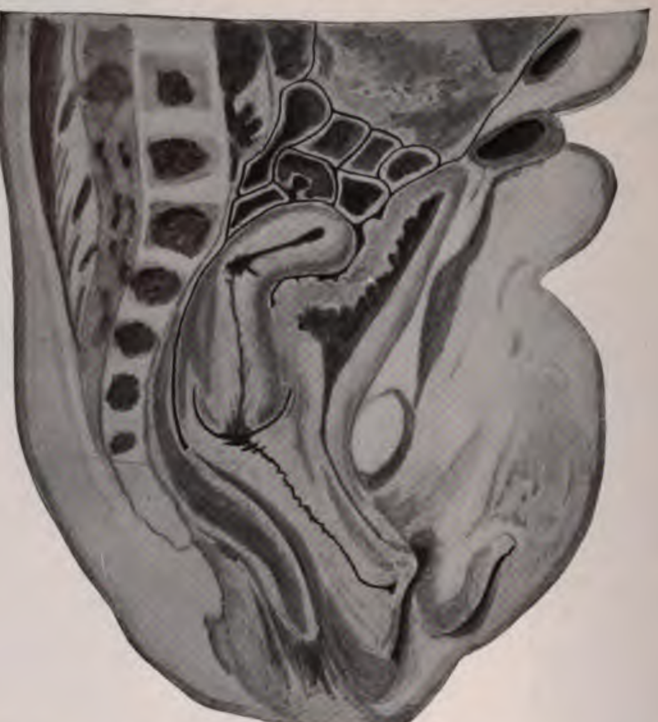


Fig. 423.—Vertical mesial section of the pelvis of a large fetus at time of birth. (Webster—*Diseases of Women.*)

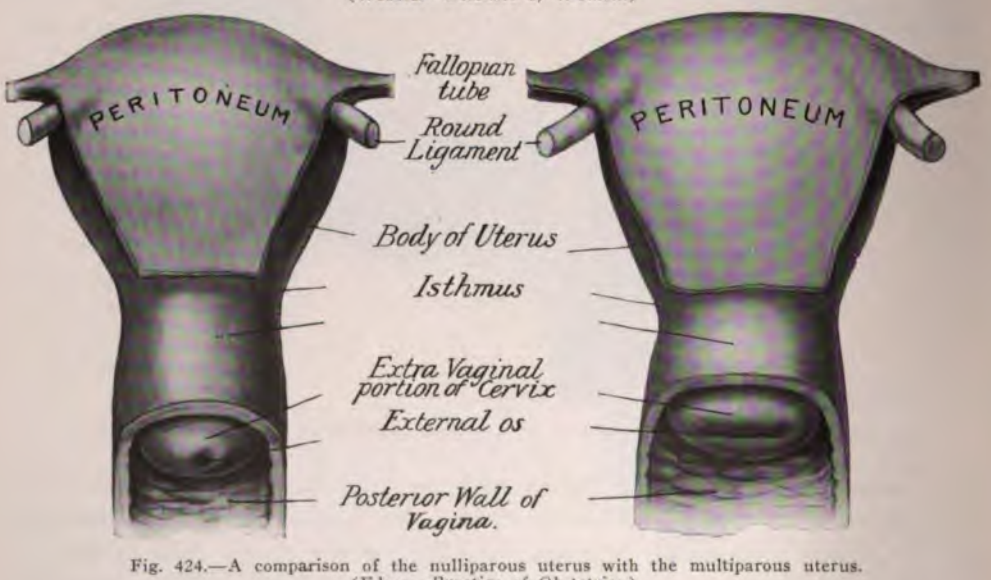


Fig. 424.—A comparison of the nulliparous uterus with the multiparous uterus. (Edgar—*Practice of Obstetrics.*)

ness is one inch. It weighs an ounce to an ounce and a half. After **childbirth** the uterus is always a little larger than the virgin uterus (Fig. 424). This is the kind most frequently requiring examination. The cavity measures two and one-half to three inches. After the **menopause** there is marked atrophy of all the genital organs, including the uterus (Figs. 441, 442, 443). The extent of the atrophy of the uterus is variable. In the very aged it may be reduced to a nodule the size of the end of the thumb, and the cervix then no longer projects into the vaginal cavity, but is felt simply as an indurated area, with a small central opening, situated in the upper part of the anterior vaginal wall.

Structure of the Uterus

The uterus is a hollow muscle. The central cavity is lined with mucous membrane while the external surface of the muscle is covered with peritoneum. The wall of the uterus is, therefore, composed of three layers—peritoneal, muscular, and mucous (Figs. 417, 425).

1. **Peritoneal Layer.**—This forms a delicate serous covering to the uterus. It does not differ materially from peritoneum elsewhere. There are certain portions of the uterus which are not covered by peritoneum, namely, the lateral portions of the body and the front and sides of the cervix (Fig. 451).

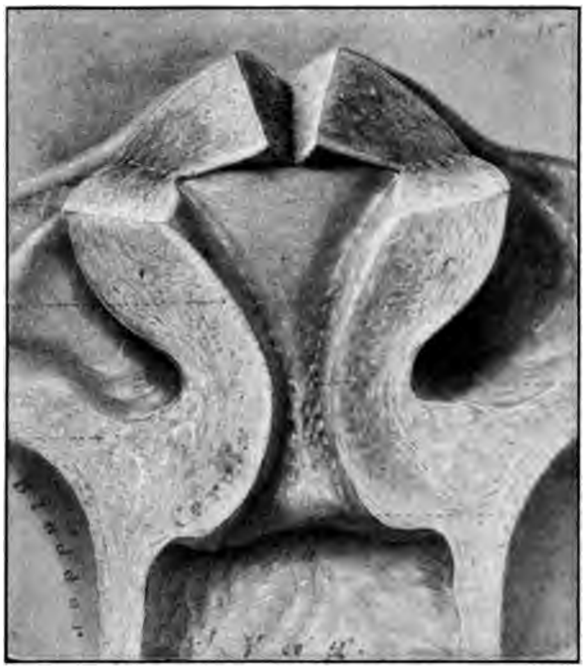


Fig. 425.—A normal uterus divided from in front, showing the smoothness of the endometrium and also its relative thickness. (Cullen—*Cancer of the Uterus.*)

Fig. 426.—Photograph of normal uterine wall magnified approximately two times, showing the relative thickness of the endometrium and the myometrium. Gyn. Lab.

2. **Muscular Layer.**—This is the real wall of the uterus (Fig. 426). It is 11 to 15 mm. thick and is composed of involuntary muscular tissue. Under the microscope, the principal elements are seen to be the long muscle cells. They are fusiform in shape and are arranged in parallel rows. These rows of muscle cells are arranged in bundles that extend in various directions.

The muscular wall of the uterus is divided somewhat into **strata.** In the unimpregnated uterus, the different strata are not clearly defined, but, speaking in a general way, it may be said that the muscular bundles are arranged in three strata—a thin outer longitudinal stratum, a thick middle stratum of interlocking bundles extending in various directions, and a thin inner longitudinal stratum.

The **connective tissue** of the muscular layer comprises most of the connective tissue of the uterus. It is not distributed in the form of distinct strata, but appears as irregular masses surrounding and supporting the important elements. There is a very intimate connection between the mucous membrane lining the uterus and the connective tissue of the muscular layer.

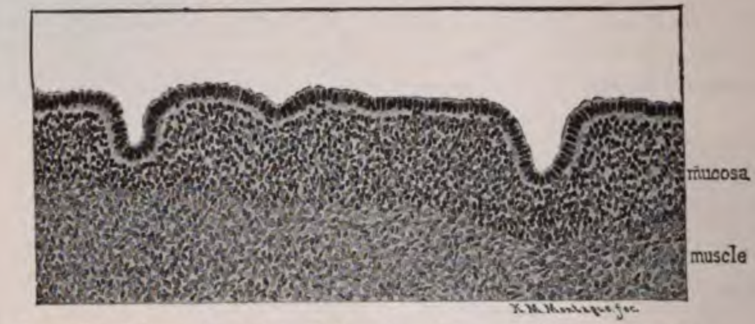


Fig. 427.—Endometrium of an infant, just born. (Williams—*Obstetrics.*)

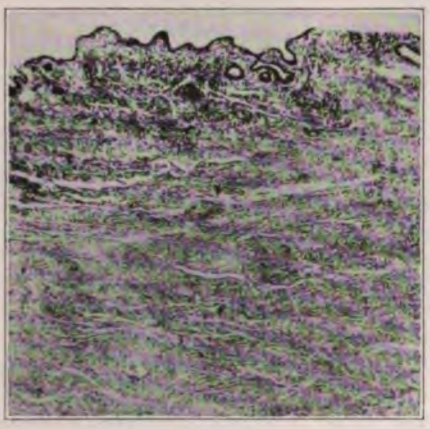


Fig. 428.—Microscopic section of uterine wall of child, aged 8 years. Gyn. Lab.

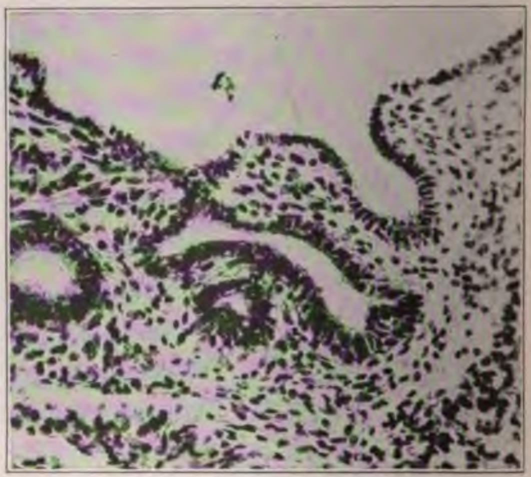


Fig. 429.—Higher power of the upper central portion of Fig. 428. Gyn. Lab.

The **blood vessels** of the muscular layer include most of the vessels of the uterine wall. The arteries are distinguished in a microscopic section, by their thick walls and folded intima. The outer vessels run in a longitudinal direction, while the inner vessels run perpendicular to the mucous surface. There is a dense capillary network close to the mucous membrane.

The veins are very large and have thin walls.

The **lymphatics** of all the coats of the uterus (peritoneal, muscular, and mucous) empty into large lymphatic vessels in the external muscular stratum. These in turn empty into efferent trunks at the sides of the uterus.

The **nerves** of the muscular layer are derived from the sympathetic. The filaments ramify among the muscular bundles and terminate in the nuclei of the muscle cells.

3. **Mucous Layer.**—The mucous membrane of the uterus lies directly on the internal muscular stratum, the usual submucous layer of loose connective tissue being absent (Figs. 426, 430). Scattered muscular filaments extend into the mucosa, so the connection between the two is firm. The mucous membrane of the body of the uterus is known as the "endometrium." That lining of the cervix is known as the "cervical mucosa."

The **endometrium** is 2 to 6 mm. thick in the child-bearing period, and is disposed over the interior of the uterus as a smooth layer (Fig. 425). It is soft and velvety to the touch, and when perfectly fresh has a pink color. There is a great difference in the thickness and general appearance of the endometrium in the different periods of life. The endometrium in infancy is shown in Fig. 427; in early childhood, in Figs. 428 and 429; in adult life (child-bearing period) in Fig. 430, and after the menopause in Figs. 442 and 443.

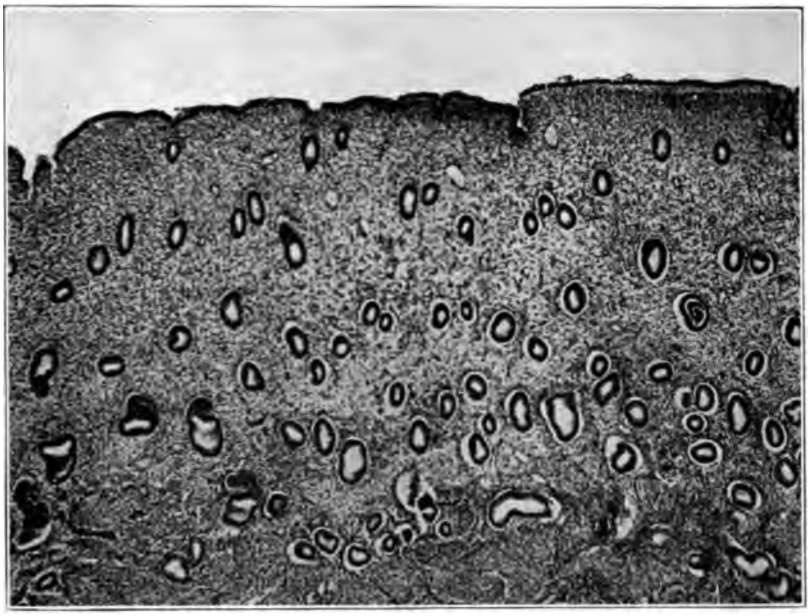


Fig. 430.—Normal endometrium, mid-interval. The stroma is quite compact and the glands are seen as simple tubular glands. However, the glands are not so simple as appears on one cross section. Modeling of the glands from serial sections demonstrates their frequent branching. Gyn. Lab.

The basis of the endometrium is a tissue composed almost exclusively of oval cells, somewhat larger than a leucocyte and having a round or oval nucleus that stains lightly (Fig. 431). The nucleus is so large that it occupies most of the cell. When stained it is reticular, i.e., it shows the chromatin bands and does not stain a solid dark color as does the nucleus of a lymphocyte.

These oval cells with the large reticular nucleus are known as **stroma cells** (Fig. 431). They are packed closely together, with nothing separating them except a few cell processes and a small amount of serous or mucoid intercellular substance. The tissue thus formed is known as **cytogenic tissue.** When a specimen of it is stained, the microscopic field seems to be almost entirely occupied by rounded or oval reticular nuclei (Fig. 431). The cell-protoplasm stains so lightly and is so small in amount that it is scarcely noticeable. The stroma probably represents embryonic connective tissue. In the resting endometrium the stromal cells are closely packed and stain very deeply. Under certain conditions, however, they become swollen and stain more lightly. This occurs in the premenstrual stage and, especially, during pregnancy. In the latter case, they greatly enlarge and become the decidua cells. Under these conditions, also, the intercellular serous or mucoid material becomes noticeable, thus giving the whole an edematous appearance.

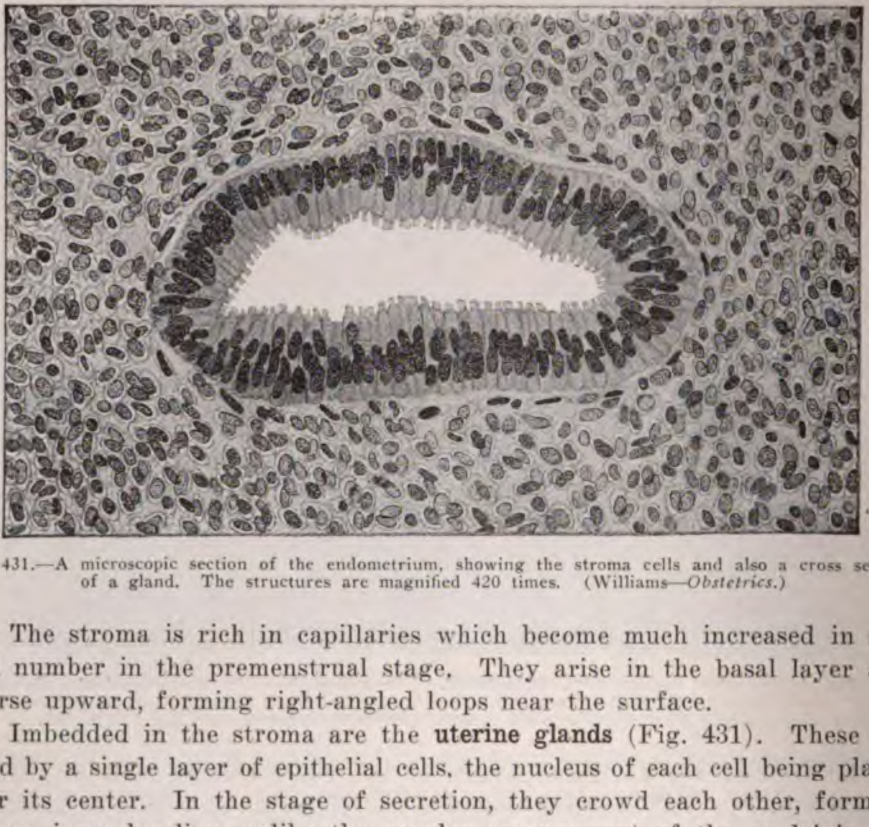


Fig. 431.—A microscopic section of the endometrium, showing the stroma cells and also a cross section of a gland. The structures are magnified 420 times. (Williams—*Obstetrics.*)

The stroma is rich in capillaries which become much increased in size and number in the premenstrual stage. They arise in the basal layer and course upward, forming right-angled loops near the surface.

Imbedded in the stroma are the **uterine glands** (Fig. 431). These are lined by a single layer of epithelial cells, the nucleus of each cell being placed near its center. In the stage of secretion, they crowd each other, forming a very irregular line, unlike the regular arrangement of the nuclei in the cervical glands. The glands extend from the depth of the endometrium and open upon the surface (Figs. 430, 440). They vary considerably in different parts of their course, especially in the premenstrual stage.

The **menstrual changes** in the endometrium are very marked. During menstruation about two-thirds of the endometrium desquamates, leaving only the so-called basal layer. This begins to proliferate immediately after the

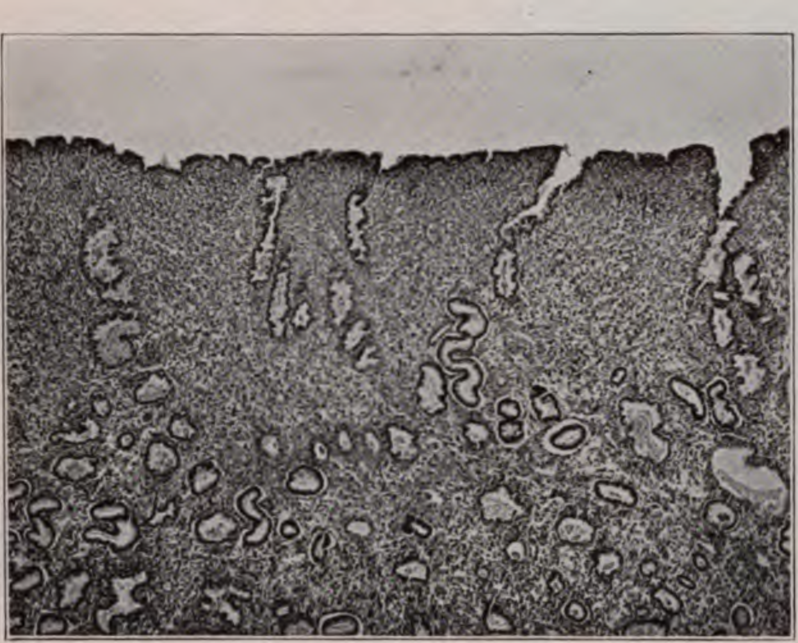


Fig. 432.—Endometrium, late interval or early premenstrual. The endometrium is markedly edematous and the glands are increased in size and varied in shape. The individual gland cells are higher and are actively secreting. The stroma cells, particularly those near the surface, show marked enlargement, somewhat resembling decidual cells. Gyn. Lab.

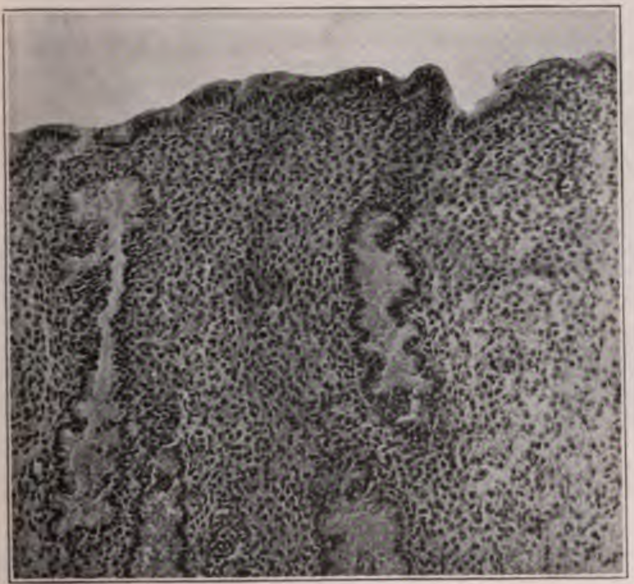


Fig. 433.—High power of upper central portion of Fig. 432. Notice that the premenstrual "tufting" has begun. Gyn. Lab.

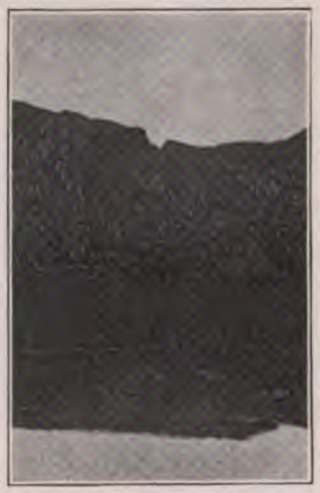


Fig. 434.—The endometrium two days before menstruation. The marked thickening of the endometrium and the dilatation of the glands are well shown. Notice also how compact the superficial layer is. Gyn. Lab.

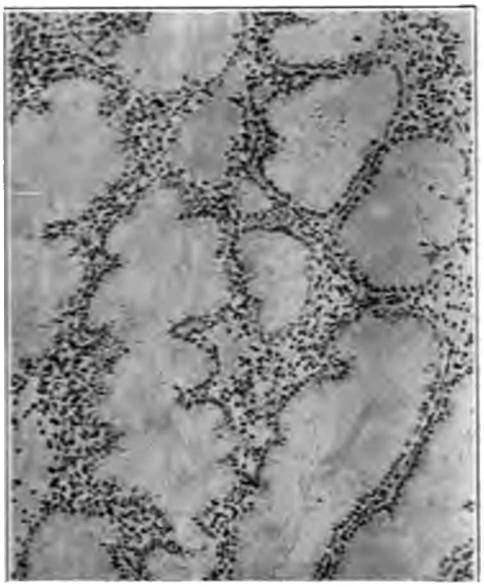


Fig. 435.

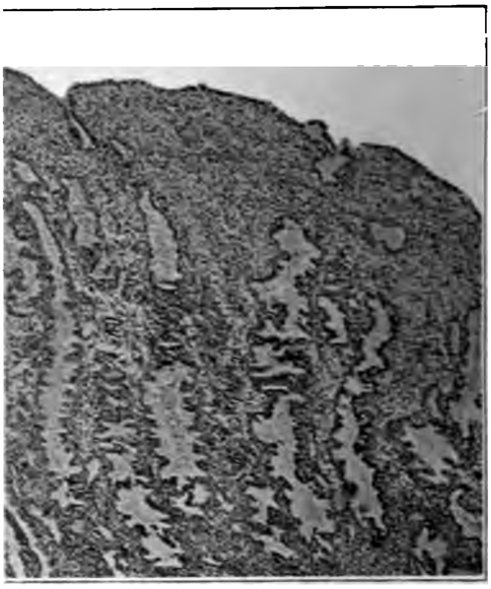


Fig. 436.

[illegible] Fig. 435 shows well [illegible] the premenstrual [illegible] are still present. [illegible] tissue yet. There is [illegible] and the capillaries are [illegible]

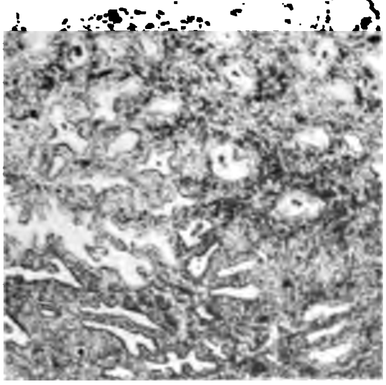


Fig. 437.

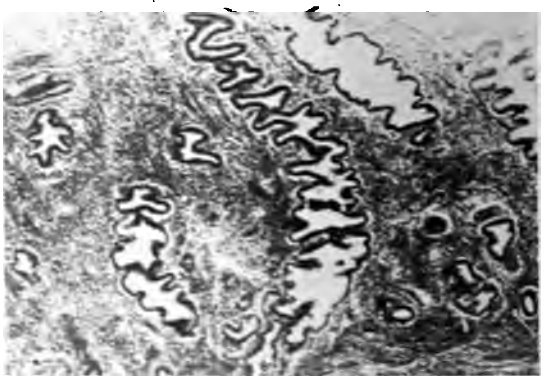


Fig. 438.

[illegible] shows an early stage [illegible] tissue yet. Fig. 438 [illegible]

cessation of the menstrual flow, reaching its maximum thickness just prior to the next period. This process is a [illegible] preparation for the lodgment and nourishment of a fertilized ovum. This cyclic change leads to great varia-

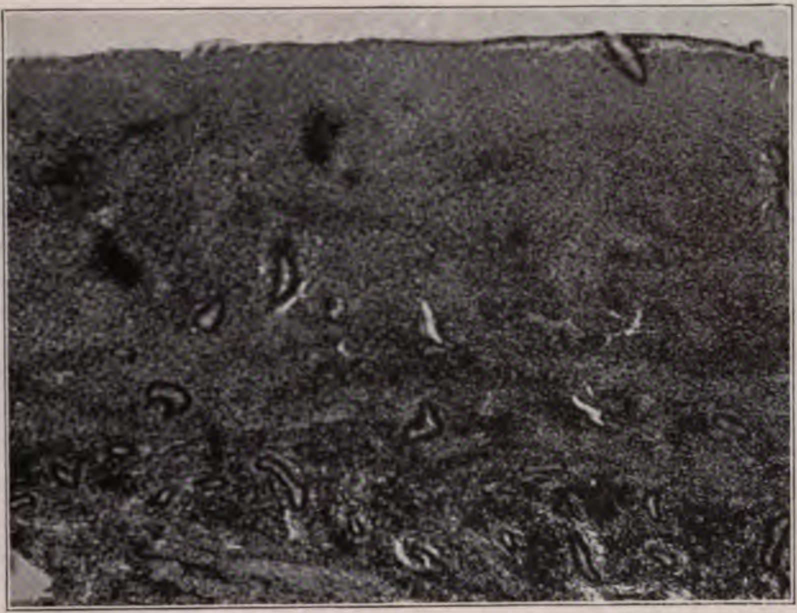


Fig. 439.—Endometrium, middle of menstruation. Glands collapsed and blood extravasated freely, especially in the compact layer.

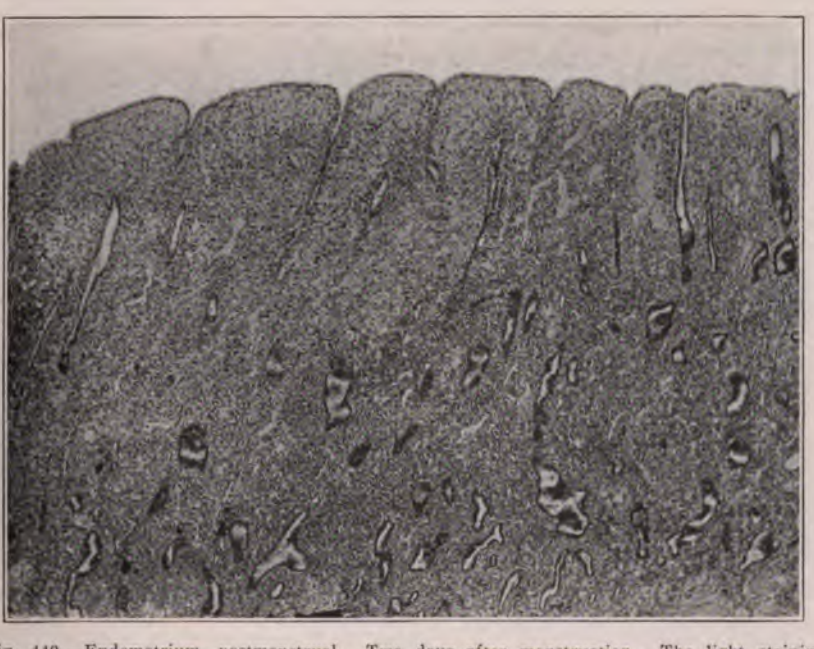


Fig. 440.—Endometrium, postmenstrual. Two days after menstruation. The light staining areas immediately below the lining epithelium represent the remains of extravasated blood. The stroma elsewhere is very compact and the cells are markedly diminished in size. The glands are in a state of collapse and the individual cells very much smaller.

tions in the thickness and appearance of the endometrium, the details of the microscopic picture depending on the stage of the cycle at which the specimen was secured. So radical are these normal menstrual variations in microscopic appearance (Figs. 430 to 440) that some of them were for a long time supposed to represent pathological states. An understanding of these normal variations is elemental to an understanding of the physiology and pathology of the endometrium.

The endometrium may be roughly divided into three layers or zones, the basal, spongy and compact layers. This division, however, is not always apparent in the resting endometrium. In the basal layer, the stroma is compact, the glands are small and the nuclei of both stroma and gland epithelium stain deeply. This layer is not much, if at all, affected by changes incident to the menstrual cycle. It represents the endometrium in a state of rest. Above this is the spongy layer in which the glands are more numerous and tortuous, especially in the latter half of the cycle. It is the portions of the glands found in this layer which manifest the greatest activity before the onset of menstruation. At this time the glands are numerous, the amount of stroma being relatively small; they are very tortuous and much enlarged (Fig. 436). Within their lumen, the cells crowd each other until they pile up, forming the characteristic premenstrual tufts (Fig. 435). The stroma cells in this layer are larger, stain less deeply, and are not so closely packed as in the basal layer. That portion of each gland found in the upper or compact layer represents the duct and is a fairly straight tubule (Fig. 440). The epithelial cells are relatively small and the nuclei stain deeply. The stroma cells in this layer become much enlarged in the premenstrual stage. They take the stain lightly and resemble decidua cells.

The compact and spongy layers are shed during menstruation, the endometrium being regenerated from the basal layer.

The free surface of the endometrium is covered by a single layer of the same columnar epithelium (Fig. 433) similar to that lining the glands. Cilia have been demonstrated on the epithelium lining the glands, but their occurrence on the surface epithelium has been denied by careful observers.

The endometrial changes of **pregnancy** are practically those of the premenstrual stage in a more marked degree. They are fully described in text-books on obstetrics.

In **infancy** the endometrium is thin, the glands are few in number and simple in structure (Figs. 427 to 429). After the **menopause** there is a gradual atrophy, manifested first in the glands and later in the stroma. The latter may be partly replaced by [illegible] (Figs. 442, 443).

Peculiarities of the Cervix Uteri

[illegible] ly of the uterus [illegible]

a. [illegible] (Fig. 451).

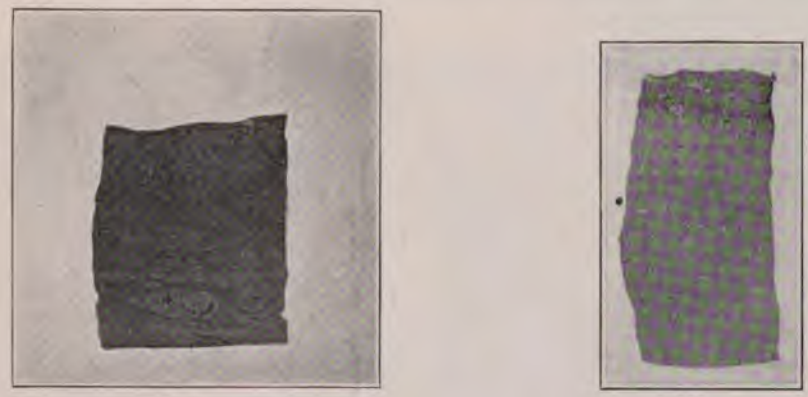
b. [illegible] proportion of [illegible]

c. [illegible] blood vessels [illegible] ly of the uterus.

d. [illegible] is disposed

in prominent folds (Figs. 417, 418, 422). These folds extend more or less obliquely outward from two ridges, one situated near the center of the posterior lip and the other near the center of the anterior lip.

e. The glands of the cervix approach the racemose variety. They consist of branching ducts with dilated ends (Figs. 444, 445). The glands are lined with columnar epithelial cells which are even taller than those on the surface. The nucleus of each cell lies at the base. These cells secrete mucus which does not stain appreciably in ordinary preparations (hematoxylin and eosin), consequently that portion of the cell lying next to the lumen, which part of the cell is usually filled with mucus, appears clear (Figs 444, 445).



A. B.

Fig. 441.—Practically normal senile uterine wall contrasted with the normal wall of the child-bearing period, some magnification. *A.* Senile uterine wall, age 62. *B.* Normal uterine wall of child-bearing period. Gyn. Lab.

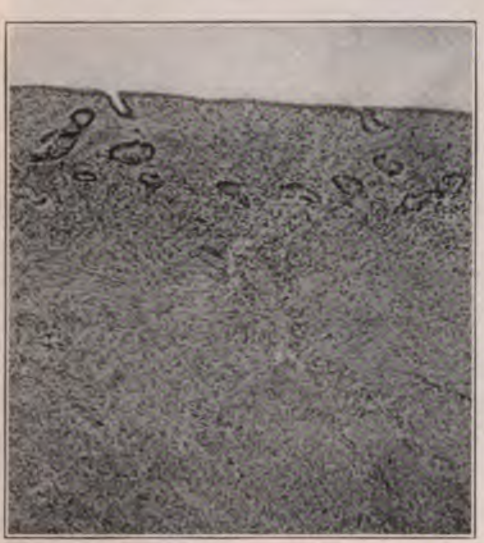


Fig. 442.

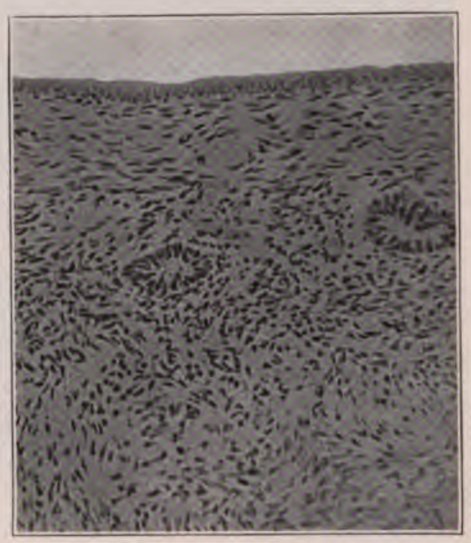


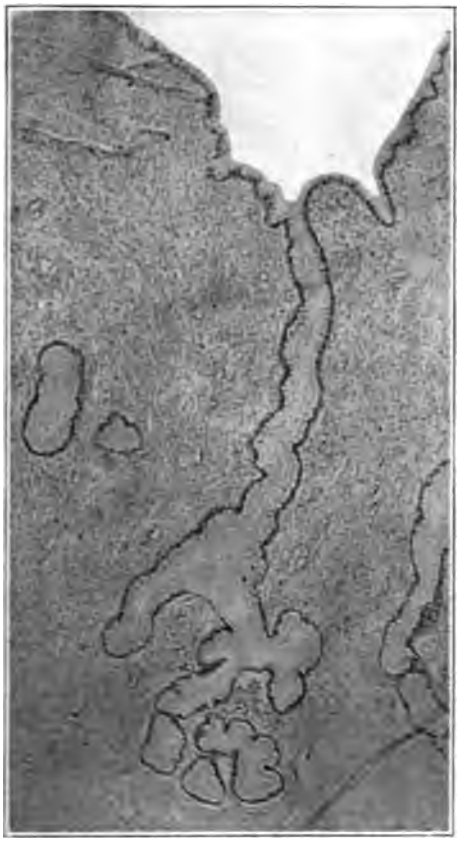
Fig. 443.

Figs. 442 and 443.—Senile endometrium, age 62. Shows marked thinning of endometrium, stroma scant, and glands few. Entire thickness of endometrium only ½ mm. Fig. 443 is high power of same, showing the atrophic changes in the stroma and glands. Gyn. Lab.

The glands of the cervix secrete a clear viscid tenacious mucus that fills the cervical canal and serves to close it and prevent invasion of the uterine cavity. The ducts of these glands sometimes become obstructed causing retention cysts (Figs. 471, 472). These are sometimes called "ovulae Nabothi." There may be many of them, in which case the cervix is said to be in a state of "cystic degeneration" (Fig. 479).

f. The layer of cytogenic tissue with characteristic stroma cells, is comparatively thin in the cervix.

g. The cervical mucosa does not take part in the changes of menstruation or pregnancy, except in rare cases. It does, however, undergo the atrophy of senility, but here the change is not so marked as in the endometrium for the cytogenic tissue is not so abundant.



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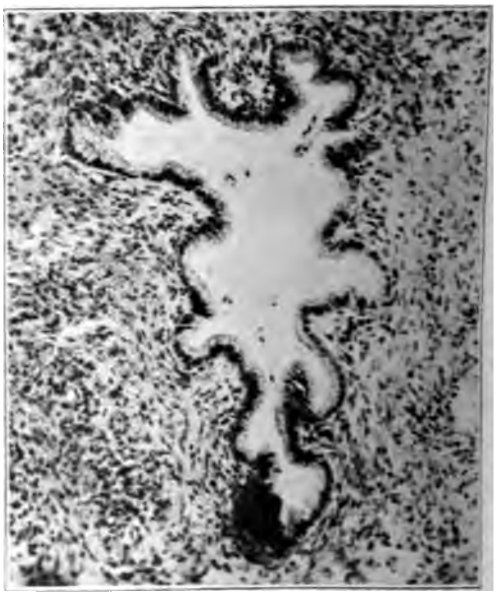


[illegible] section through a practically [illegible] gland. The branched character of [illegible] in this and the preceding [illegible] the high cell with the nucleus [illegible] the base. Gyn. Lab.

Vessels and Nerves of the Uterus

The blood supply of the uterus comes from the uterine and ovarian arteries. The uterine artery on each side arises from the anterior trunk of the internal iliac (Fig. 446) and passes inward and downward between the layers of the broad ligament to just above the lateral vaginal fornix. It then turns upward and runs in a very tortuous course along the side of the uterus. Near the top of the uterus it joins the descending branch of the ovarian artery (Fig. 447).

As it runs along the side of the uterus, the uterine artery gives off many branches which run horizontally about the organ and supply various segments. These anastomose with corresponding branches of the opposite artery. These branches are very tortuous, the tortuous and spiral arrangement being so marked that they have been called the "curling arteries" of the uterus. A horizontal branch of considerable size at the level of the internal os is known as the "circular artery."

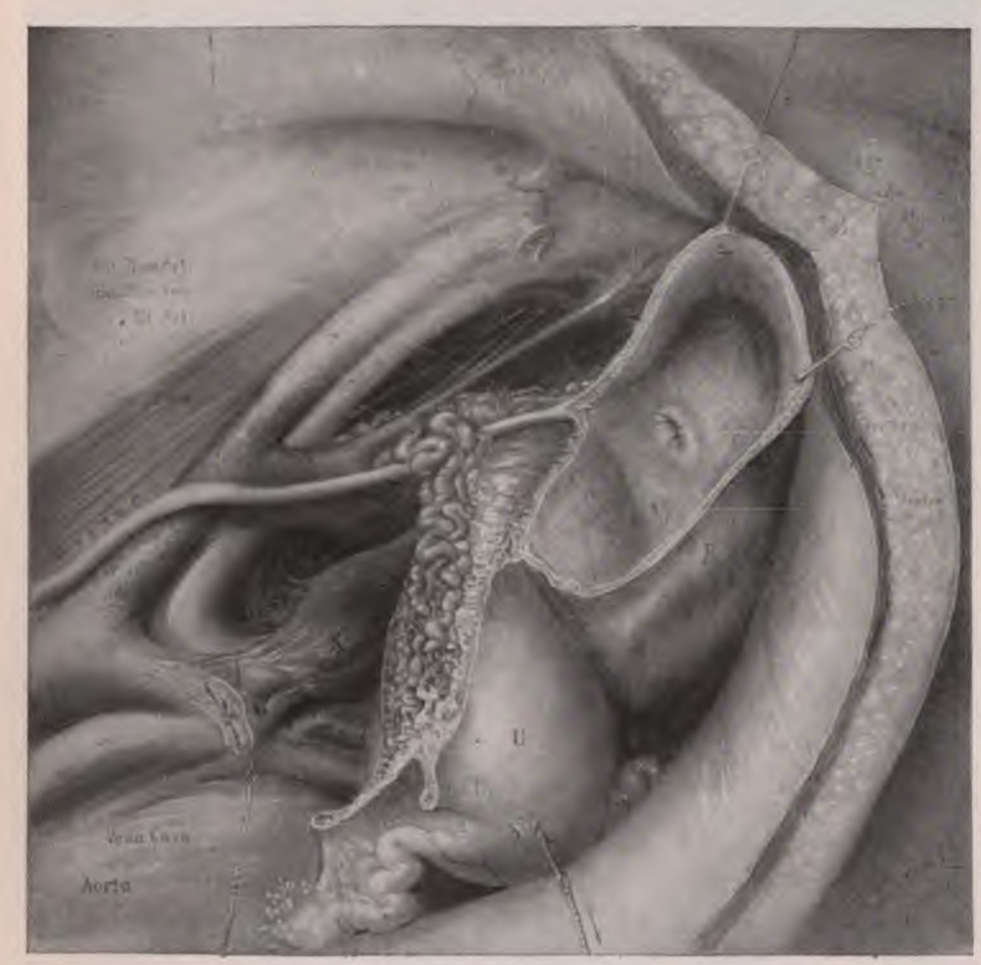
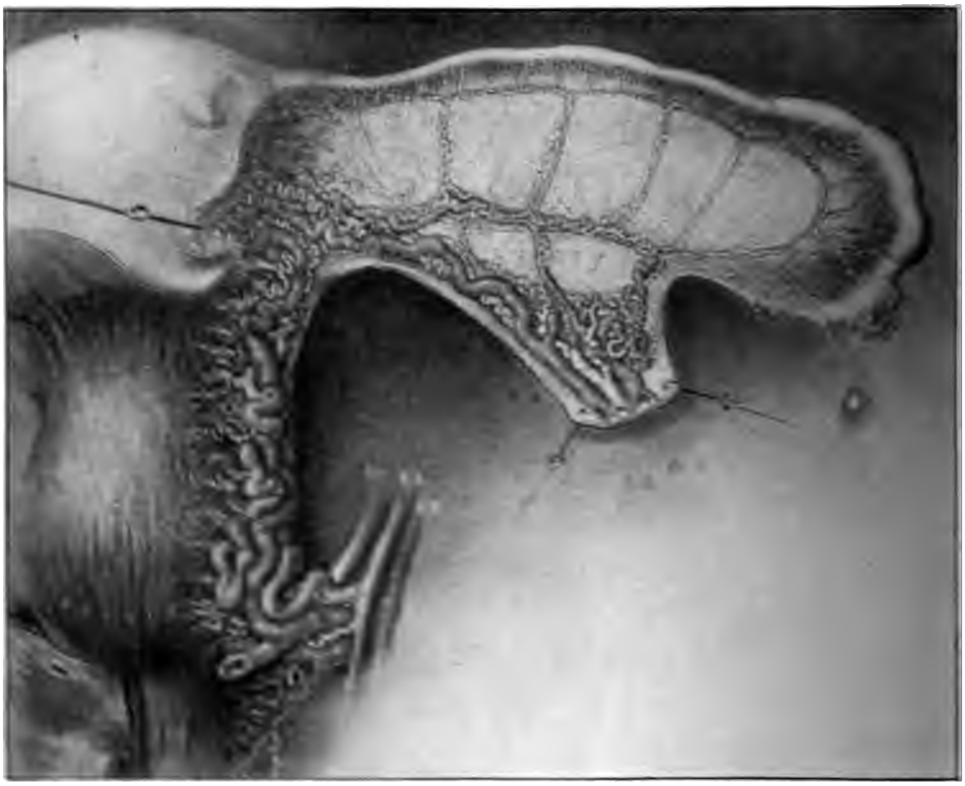


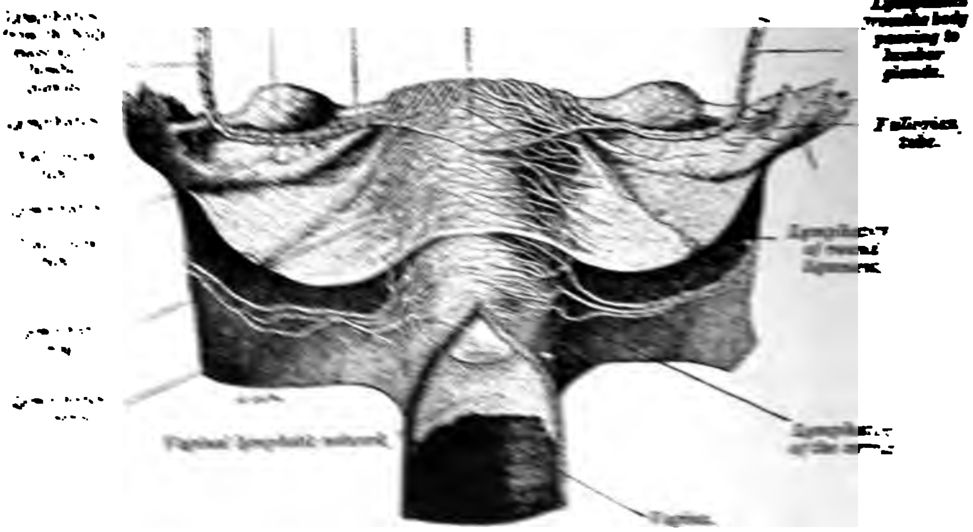
Fig. 446.—The blood supply of the uterus. Showing the uterine artery as it leaves the anterior trunk of the internal iliac. (Kelly—*Operative Gynecology*.)

The **ovarian artery** of each side supplies the tube, and ovary and upper part of the uterus (Fig. 447). They correspond to the spermatic arteries in



[illegible] artery along the side [illegible]

[illegible]


Lymphatics from the body passing to lumbar glands.
Fallopian tube.
Lymphatics of round ligament.
Lymphatics of the cervix.
Vaginal lymphatic network.
Vagina.

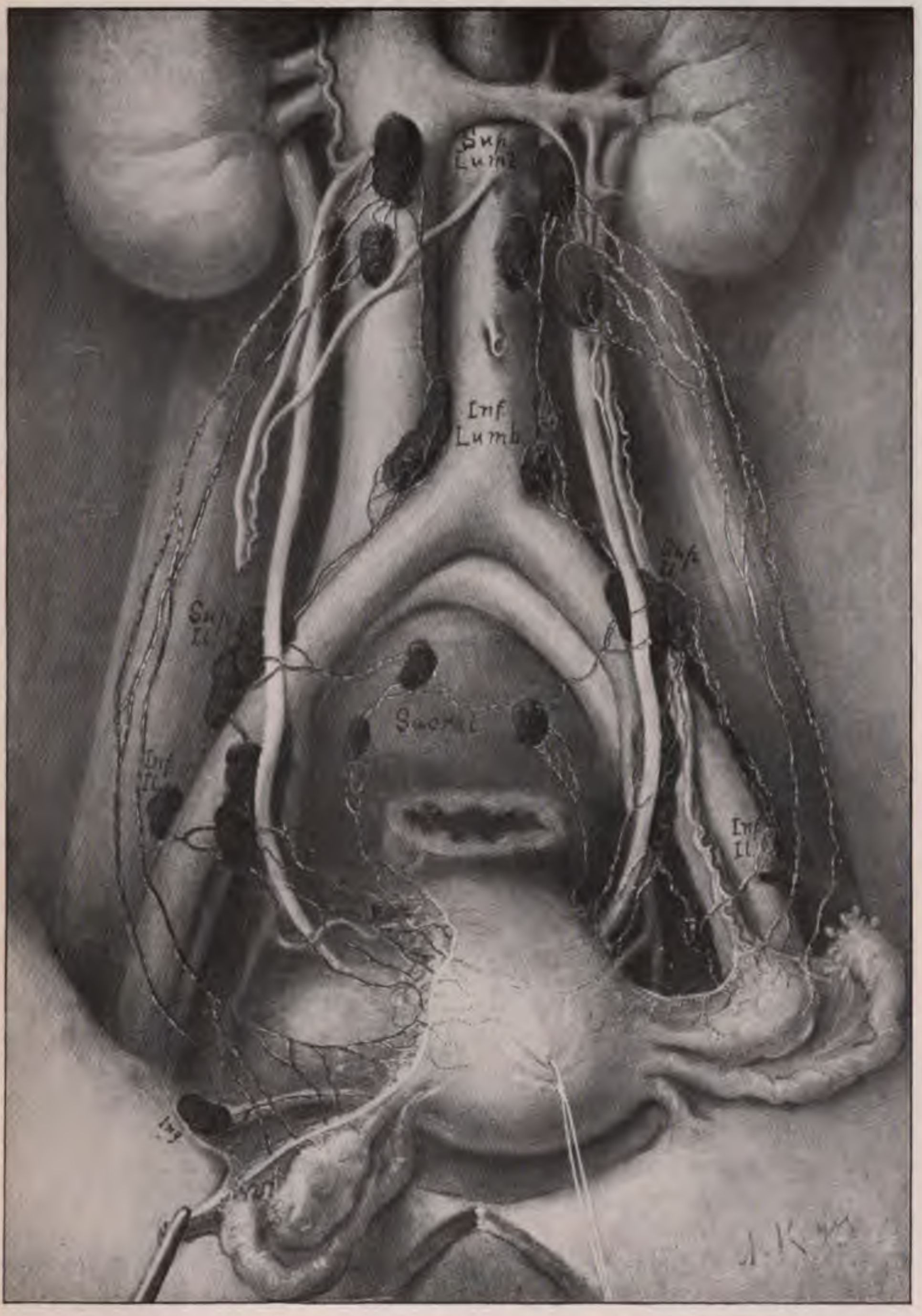


Fig. 449.—The distribution of the lymphatics of the uterus to the various groups of glands. (Doederlein and Kroenig—*Operative Gynaekologie.*)

the male and arise directly from the aorta. The artery of each side passes downward and enters the broad ligament. After giving off the branches that supply the ovary, the artery passes on to the upper part of the uterus where it divides into two branches. The upper branch supplies the fundus uteri and anastomoses with the corresponding branch of the opposite artery. The lower and larger branch descends along the side of the uterus and anastomoses with the uterine artery. Some authorities describe the uterine artery as supplying all the side of the uterus and a part of the tube, and anastomosing with the ovarian artery some distance out along the tube. Possibly the distribution differs considerably in different individuals.

The **veins** of the uterus are exceedingly numerous. The organ is surrounded by a vast network of these vessels, which receive the blood from the veins and sinuses within its walls. There is free communication of these plexus with the vaginal and vesical plexus below and with the ovarian (pampiniform) plexus above, the blood ultimately emptying into the internal iliac vein.

An important fact, from a surgical standpoint, is that in the median line the uterus is almost free of blood vessels—so much so that it may be bisected (as is frequently done in vaginal hysterectomy) with but little hemorrhage.

The **lymphatics** of the uterus may be divided into two groups, the lymphatics of the cervix and the lymphatics of the body of the uterus, as shown in Fig. 448. The lymphatics of the cervix uteri join with those of the upper part of the vagina and empty into the sacral and hypogastric and superior iliac glands. The lymphatics from the corpus uteri join with those of the tube and ovary and empty into the lumbar glands. A few lymphatics from the uterine cornua pass along the round ligaments and empty into the inguinal glands. The distribution of the uterine lymphatics to the various glands is shown in Fig. 449.

The **nerves** [illegible] hypogastric plexus of the sympathetic [illegible] of the central nervous system.

Ligaments of the Uterus

The [illegible] and by certain ligaments [illegible] and ligaments, the [illegible]

The **vesicouterine ligament** [illegible] peritoneum extending [illegible]

The **sacrouterine ligaments** [illegible] extending from the [illegible]. They contain also [illegible]

The **round ligament** [illegible] arises from [illegible] extends outward [illegible] the internal inguinal [illegible] canal and at the [illegible] the tissues cov- [illegible] or five inches [illegible] of the uterus.

Ordinarily they are lax but when the uterus is displaced backwards by a full bladder or other condition, they are made tense and help to bring the uterus back to its accustomed position. It is the round ligaments that are shortened in certain operations for the cure of backward displacement of the uterus.

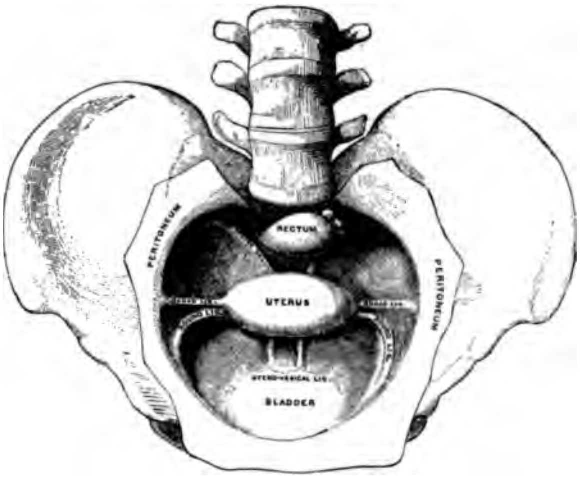


Fig. 450.—The ligaments of the uterus. (Hodge—*Diseases Peculiar to Women.*)

The **broad ligament** of each side extends from the lateral portion of the uterus to the pelvic wall (Fig. 450). The attachment to the uterus extends all along the side of the organ from the cervix to the fundus, and there is a correspondingly wide attachment to the pelvic wall. This gives a broad band of tissue (hence the name "broad" ligament) extending from the lateral margins of the uterus to the pelvic wall and holding the uterus in its appointed position in the center of the pelvic cavity (Figs. 4, 450). Each broad ligament is composed of two layers of peritoneum (Fig. 451), and between them are a number of important structures. This disposition of the peritoneum and consequent formation of the broad ligaments, is represented very well

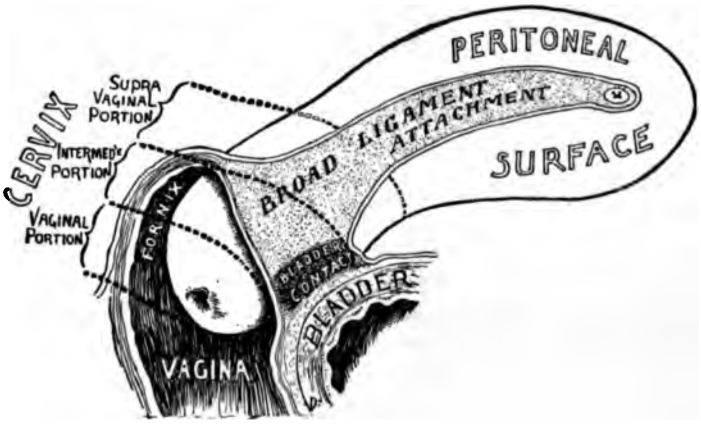


Fig. 451.—Showing the relations of the uterus to the vagina and bladder and peritoneum. (Dickinson—*American Textbook of Obstetrics.*)

by a thin cloth laid over the pelvis and then tucked down snugly around the pelvic organs. The peritoneum covering the anterior surface of the uterus, when continued laterally forms the anterior layer of the broad ligament, and that covering the posterior surface of the uterus, continued laterally, forms the posterior layer of the broad ligament. Between these two layers of peritoneum is a considerable amount of connective tissue, especially at the lower part (Fig. 451). This connective tissue area around the uterus is known as the "parametrium," and inflammation there is spoken of as "parametritis." Between the peritoneal layers of the broad ligament are the following important structures:

a. Fallopian tube (Figs. 3, 4, 5).

b. Ovary (Fig. 4). This is not really situated in the broad ligament but rather *on* the posterior surface of the ligament. There is, however, a break in the peritoneum at this point through which the hilum of the ovary is in direct continuation with the connective tissue and vessels of the broad ligament (Fig. 807).

c. Parovarium (Figs. 418, 826, 827).

d. Ovarian vessels (Fig. 447).

e. Round ligament (Figs. 5, 450).

f. Uterine vessels (Figs. 446, 447).

g. Ureter. The ureter, in its course to the bladder, lies in the lower part of the broad ligament, near the cervix and just under the uterine artery (Figs. 446, 447).

PATHOLOGIC CHANGES

By the term "pathologic changes" as here used, the author does not refer to diseases, but only to individual structural changes, as encountered in various combinations in the inflammatory and nutritive diseases of the uterus.

An entirely satisfactory classification of the inflammatory and nutritive diseases of the uterus is not possible along the simple lines which suffice in some other localities.

A SYMPTOMATIC classification is found wanting because cases giving the same symptoms may present very different etiologic factors and pathologic conditions (in fact, the same case may show several distinct pathologic changes in combination). On the other hand, a classification strictly according to ETIOLOGY or PATHOLOGY alone, is not satisfactory, for the same etiologic factors may give rise to various pathologic changes, and, again, pathologic changes essentially the same, may give rise to various clinical pictures. So true is this, that in many cases it is impossible, from the symptoms and usual examination signs, to determine certainly the etiology of the trouble or the exact pathologic changes present.

It must be kept in mind also that the normal uterus, and especially the endometrium, undergoes marked physiological changes incident to puberty, senility, the menstrual cycle and pregnancy. Some of these normal variations so closely resemble certain pathological conditions that it is impossible at times to draw a distinct line of demarkation. A knowledge of the physiology of the genital organs is essential to an understanding of their pathological changes.

Probably the best way to present this subject is to give first the essential pathologic changes that take place in the uterus as the result of inflammatory and nutritive disturbances, and then to take up the separate diseases, classified largely according to symptoms but bearing in their titles such etiologic and pathologic distinctions as are usually easily determined.

The **nutritive changes** found in the uterus are due largely to modifications in the quantity or quality of the blood supplied to the tissues, though the innervation and the lymph flow probably exercise some influence. The quantity and quality of blood supplied to the uterus may be modified by many conditions, for example, general diseases causing pronounced anemia, acute diseases causing toxins and other abnormalities in the blood, heart disease causing venous congestion of the uterus, acute pelvic inflammation causing arterial congestion of the uterus, tumors and malposition causing venous congestion, etc. How all these various conditions might indirectly influence the blood supply of the uterus by directly affecting ovarian function, will be discussed in Chapter XV.

Under nutritive changes may be classed the following:

Hyperemia (arterial and venous).
Serous infiltration.
Hemorrhagic infiltration.
Disintegration and liquefaction.
Hyperplasia.
Hypertrophy.
Atrophy.
Obstruction of glands, with cystic dilatation.
Hyaline degeneration.

The **inflammatory changes** are due to severe local irritation. The local irritation may be due to chemical substances (as in cauterization of the endometrium with penetrating chemicals) or to heat (as in cauterization by steam) or to invading cells (as in cancer) or to bacteria and their products (as in the various infections). Bacteria and their products constitute by far the most frequent cause. In inflammation, the nutrition of the tissues is more or less disturbed and consequently there may occur any of the various nutritive changes already mentioned, in addition to the changes distinctive of inflammation.

The inflammatory changes are as follows:

Round cell infiltration (leukocyte infiltration and lymphocyte infiltration).
Connective tissue formation.
Thrombosis.
Necrosis.
Abscess formation.
Sloughing.

Space is too limited to accommodate the details of these various pathologic changes. Each change mentioned, however, has definite characteristics and significance, which will be found elucidated in works on Pathology.

CLASSIFICATION OF DISEASES

In the inflammatory and nutritive diseases of the uterus, there are all gradations in pathologic conditions, from a slight nutritive disturbance in a uterus otherwise normal, to the terminal stage—cirrhosis—which represents complete destruction of the uterus as a functionating organ. The process is progressive and depends on two factors—irritation and poor nutrition, usually represented respectively by bacteria and modification of the blood supply in quality or quantity. One or the other of these factors is always present, and in many cases both are present, the character of the disease depending on the predominating factor.

Though no entirely satisfactory classification of the inflammatory and nutritive diseases of the uterus has yet been devised, the following classification does very well. It is practical, in that the various named conditions are as a rule distinguishable clinically, and the names are sufficiently descriptive and accurate to indicate in a general way the pathology of each condition.

In the **cervix uteri** there occur the following inflammatory and nutritive diseases:

Acute endocervicitis.
Chronic endocervicitis.
Erosion of cervix.
Ulcer of cervix.
Laceration of cervix.
Hypertrophy of cervix.
Polypi of cervix.

In the **corpus uteri** there occur the following inflammatory and nutritive diseases:

Hyperplasia of endometrium.
Acute endometritis.
Chronic endometritis.
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

LOCALIZATION OF DISEASES

[illegible] parts of the [illegible] show a marked tendency to affect all portions of the genital tract—spreading from the cervix to the endometrium and from there to the fallopian tubes and to the peritoneal cavity, and also through the wall of the uterus to the periuterine connective tissue and to the peritoneum. In tuberculous infection the progress is generally downward, the infection spreading from the fallopian tubes to the endometrium. Other processes affect the whole uterus simultaneously, though in varying degree, for example, subinvolution following labor or abortion. Still other inflammatory or nutritive processes are localized to one part of the organ, for example, erosion (cervix), hyperplasia of endometrium.

The inflammatory and nutritive diseases are localized principally as follows:

a. **Vaginal Surface of Cervix.**—This is the seat of erosions and of ulcers of various kinds.

b. **Cervical Mucosa and Adjacent Tissues.**—Here are found acute endocervicitis (septic and gonorrheal), chronic endocervicitis (septic, gonorrheal and glandular) and cervical polypi. In endocervicitis the process is not confined to the cervical mucosa but invades the adjacent tissues to a greater or less extent, hence it is sometimes called cervical metritis, signifying that the cervix as a whole is involved. But the process starts in the mucosa and the principal changes are found there, consequently the term "endocervicitis" seems preferable.

c. **Muscular and Connective Tissue of the Cervical Wall.**—Occasionally an acute inflammatory process is principally localized in the cervical wall and may result in an abscess. Usually, however, the changes in these tissues are either secondary to endocervicitis, resulting in cellular infiltration and connective tissue formation with subsequent sclerosis, or the changes are primarily nutritive in character, partaking of the nature of hyperplasia. The first condition (secondary cellular infiltration) is found accompanying cystic disease and all inflammations of the cervix, particularly chronic infected endocervicitis. The second condition (hyperplasia) is found in the so-called "idiopathic hypertrophy" of the cervix.

d. **Endometrium and Adjacent Tissues.**—Most of the inflammatory and nutritive diseases of the body of the uterus start in the endometrium. On account of the absence of a submucous connective tissue layer in the uterus (the mucosa being placed directly on the muscular wall), inflammatory processes starting in the endometrium soon affect the underlying muscular tissue, the depth to which the serous and cellular infiltration extends depending on the severity and duration of the disturbance.

The endometrium is the seat of hyperplasia, of acute endometritis (septic or gonorrheal), of chronic endometritis (septic or gonorrheal), of tuberculosis, and occasionally of syphilis.

e. **Muscular and Connective Tissue of the Corpus Uteri.**—These tissues, as previously explained, are affected in practically all cases of endometritis, but only secondarily and in a minor way. The inflammatory and nutritive affections situated principally in these tissues are acute metritis (with or without abscess formation), chronic metritis, subinvolution and hypertrophy.

f. **Peritoneal Coat of Uterus.**—Those diseases affecting principally the peritoneal layer of the uterine wall, considered under affections of the pelvic peritoneum, are peritonitis and tuberculosis of the peritoneum (see Chapters X and XI).

ACUTE ENDOCERVICITIS

Acute endocervicitis is acute inflammation of the lining of that portion of the uterine canal lying between the external and internal os. It is sometimes called "acute cervical endometritis" and "cervical metritis."

Etiology and Pathology

Acute endocervicitis is due to infection with the gonococcus or with ordinary pus germs. In gonorrheal vaginitis, the inflammation frequently extends into the cervix and may remain in check there for some time. If in a case of gonorrheal vaginitis applications are made within a healthy cervix, gonorrheal endocervicitis is likely to result. Some authorities hold that gonorrheal endocervicitis is usually the primary lesion and that the vagina is infected secondarily. This probably occurs in some cases but it is hardly to be considered the rule.

Ordinary septic endocervicitis may follow labor or abortion, but then it is usually overshadowed by the more serious inflammation in the body of the uterus, i. e., the septic endometritis.

The pathologic changes are practically the same whether the inflammation be ordinary septic or gonorrheal, except that the former is usually accompanied by mechanical injuries (cervical lacerations). The changes are hyperemia and swelling of the mucosa, serous infiltration and round cell infiltration. Acute endometritis may also act as a focus from infecting bacteria carried to distant tissues, especially joints.

Symptoms and Diagnosis

The principal symptom of acute endocervicitis is **increased discharge** from the cervix with irritation resulting therefrom (Fig. 138). The cervical secretion is tenacious and stringy and resembles the white of an egg except that it is less fluid and more jelly-like. The normal cervical secretion is alkaline. There is usually considerable **erosion** (Fig. 457) about the external os, from the irritating discharge. There is also **hyperemia** of the cervix and **bleeding** on slight manipulation. The patient has an uneasy sensation of weight and discomfort in the pelvis, though acute endocervicitis alone rarely causes pain. If there is much pain it is probably due to some other trouble, for which search should be made.

Acute endocervicitis causes but little trouble in diagnosis. The irritating discharge from the external os shows that there is inflammation above that point. The short duration excludes chronic endocervicitis and malignant trouble. The absence of pain and of tenderness of the body of the uterus on bimanual examination, and the absence of other symptoms of endometritis, shows that the inflammation is not in the body of the uterus, consequently it must be the cervix. When the cervical mucosa is touched with the sound or applicator it may bleed, showing that there is hyperemia and inflammation, and confirming the diagnosis previously reached by exclusion. The bleeding, however, is not a prominent feature, not nearly so prominent as in cancer and other forms of ulcer. In endocervicitis, the character of the discharge, which is markedly tenacious, indicates that most of it comes from the cervical glands. Whether or not it is gonorrheal may be determined by looking for evidences of gonorrhea elsewhere (vagina, urethra, vulvovaginal glands) and by examining the discharge for gonococci.

Treatment

The objects of treatment in a case of acute endocervicitis are three—(1) to prevent the inflammation from spreading to the mucous membrane of the body of the uterus, (2) to prevent the inflammation from extending deeply into the glandular structure of the cervix where it will become chronic and (3) to stop the irritating discharge and the consequent discomfort. In all applications and other manipulations in acute endocervicitis, if the body of the uterus is free from inflammation, it is very important not to disturb the internal os. The plan of treatment is as follows:

1. Apply protargol or silver nitrate (4 per cent to 10 per cent) to the interior of the cervix every second or third day. If the patient has gonorrheal vaginitis, the endocervical application is, of course, made at the same time that the vagina is treated. A thin strip of gauze saturated with the desired liquid is placed in the cervix and held in place for twenty-four hours by a glycerin tampon. The tenacious cervical mucus, which prevents the medicine from coming into direct contact with the mucosa, should first be removed with the forceps or cotton-wrapped applicator or small curet. A weak solution of liquor potassae helps in clearing out this mucus. After the endocervical application, a tampon soaked in boroglyceride or in ichthyol-glycerin (10 per cent) should be placed against the cervix. If a strong astringent application is desired, tannic-acid-glycerin (10 per cent) may be used on the tampon.

2. If the external os is not open sufficiently to give good drainage, it should be opened by dilatation or incision. If the whole cervix is congested and swollen, multiple punctures with the point of a bistoury, deep enough to give free bleeding, is beneficial.

3. Give a hot antiseptic vaginal douche (e. g., bichloride douche) every six to twelve hours. If there is no coincident inflammation of the vagina, an astringent douche solution may be used, such as the alum and zinc sulphate douche.

4. The patient should do but little walking and should keep rather quiet, though it is not necessary to go to bed.

Other applications which have been found beneficial are formol, 25 per cent, tincture of iodine, iodo-phenol, carbolic acid, bichloride solution (1-500), ichthyol (pure), ichthyol (25 per cent) in glycerin or lanolin, iodoform in ether (saturated solution), iodoform and tannic acid half and half. Some cases yield better to one application and some to another. Skene usually used a mixture of tincture of iodine two parts and carbolic acid one part. These strong applications should not be made oftener than every five to seven days. The application may be made with a cotton-wrapped applicator dipped into the solution or with the pipette, by which a small amount of the desired solution is placed within the cervical canal.

Acute endocervicitis occurring in conjunction with acute endometritis is overshadowed by the latter and requires little or no separate treatment.

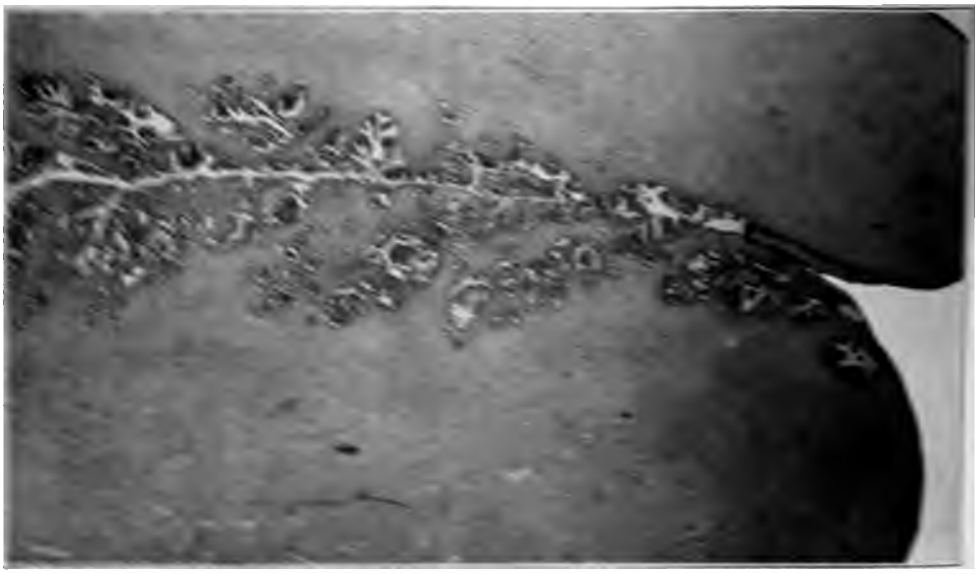
CHRONIC ENDOCERVICITIS

Chronic endocervicitis is chronic inflammation of the cervical mucosa and of the tissues adjacent thereto. It is known also as "cervical catarrh," "glandular endocervicitis," "cystic disease," "cystic degeneration," "glandular degeneration," and "inflammatory hypertrophy."

Etiology and Pathology

[illegible] septic endocervicitis usu- [illegible] in some cases the [illegible]

[illegible] chronic endocervicitis, [illegible] any form. The cervi- [illegible] scar-tissue ob-



structs the gland ducts, thus leading to cystic degeneration. Laceration also causes eversion of the mucosa so that it is exposed to friction against the vaginal wall, with consequent chronic inflammation. Anything that causes uterine congestion tends to keep up the endocervicitis.

The infecting germs penetrate into the mucosa of the cervix, affecting the glands and the interglandular tissue and causing round cell infiltration (Figs. 452, 453, 454, 455). There is increased secretion from the cervix and the discharge is irritating, causing erosion of the cervix and also causing vaginal and urethral irritation. The cervix is enlarged and chronically congested, and eversion of the mucosa takes place. If there has been laceration with eversion of mucosa, the chronic inflammation still further everts it. When there has been no cervical laceration, the mucosa may still become everted, thus enlarging the external os and giving the appearance of laceration. This swelling and eversion from chronic inflammation without laceration, may take place in the virgin, and give rise to an erroneous diagnosis of previous pregnancy (Figs. 459, 460).

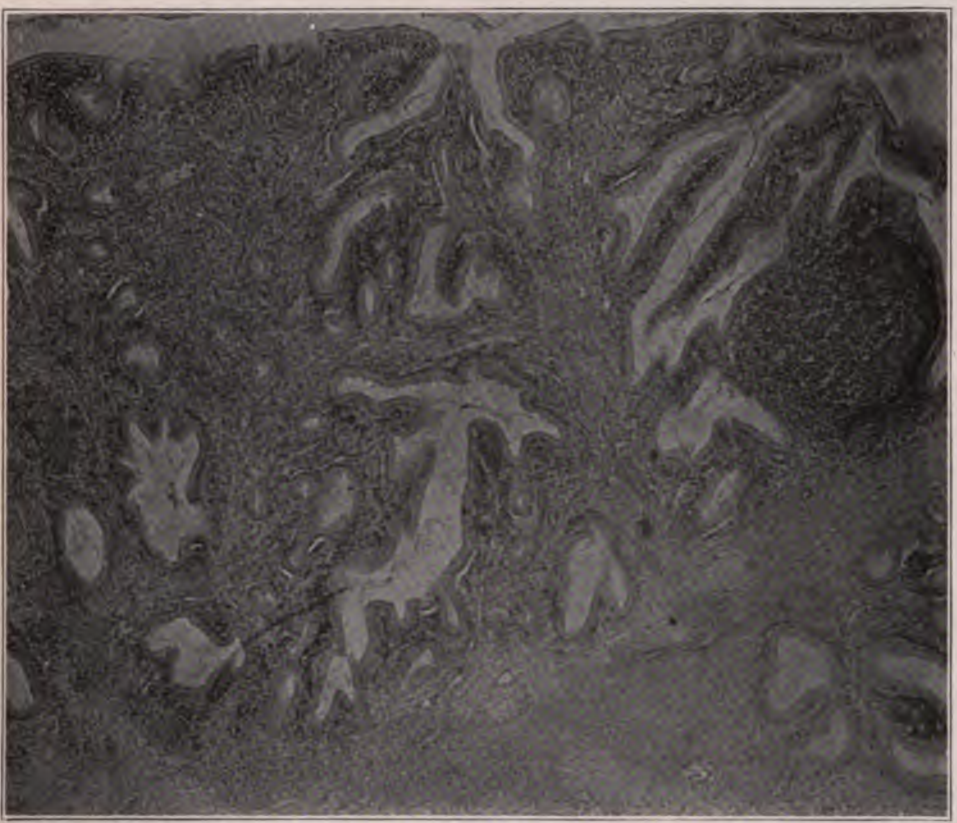


Fig. 453.—Endocervicitis, chronic. This is a high power of a small area in the left half of Fig. 452, just below the cervical canal. The lumen of the canal is seen at the upper margin. A localized infected focus is seen in the right side, with some smaller foci in other parts. These two photomicrographs show clearly why applications in the cervix canal are of little avail in curing chronic endocervicitis—the foci are outside the canal and inaccessible to such applications. Gyn. Lab.

In chronic endocervicitis the mucous membrane may become thickened irregularly, from the hyperplasia and round-celled infiltration, and thus form papillary growths. If this process goes on, it may form polypi ("mucous polypi," "cervical polypi"). If the external os is so small that there is not good drainage, the secretion will accumulate in the cervical canal and cause dilatation above the external os. This retention of irritating material may cause ulceration within the cervix.

The gland ducts become obstructed, causing the glands to be distended into small retention cysts. These distended glands are felt as hard nodules in the cervix and may give rise to an erroneous diagnosis of cancer, especially when associated with severe laceration. The cervix may be honeycombed with these small cysts, producing a condition designated as "cystic degeneration" of the cervix (Figs. 472, 479). Sometimes one or more of the cysts will contain pus and will then appear as a yellow spot on the cervix. Occasionally one of the cysts or a group of them project into the canal and finally become pediculated, forming cervical polypi. Owing to the chronic inflammation, there is lymphocyte infiltration and connective tissue proliferation, producing enlargement of the cervix—called by Emmet "areolar hyperplasia." Later the contraction of this inflammatory tissue causes more or less disintegration of the other tissue elements and finally the cervix passes into a condition of cirrhosis or sclerosis, corresponding to the same process in the body of the uterus, which is known as sclerosis or interstitial metritis.

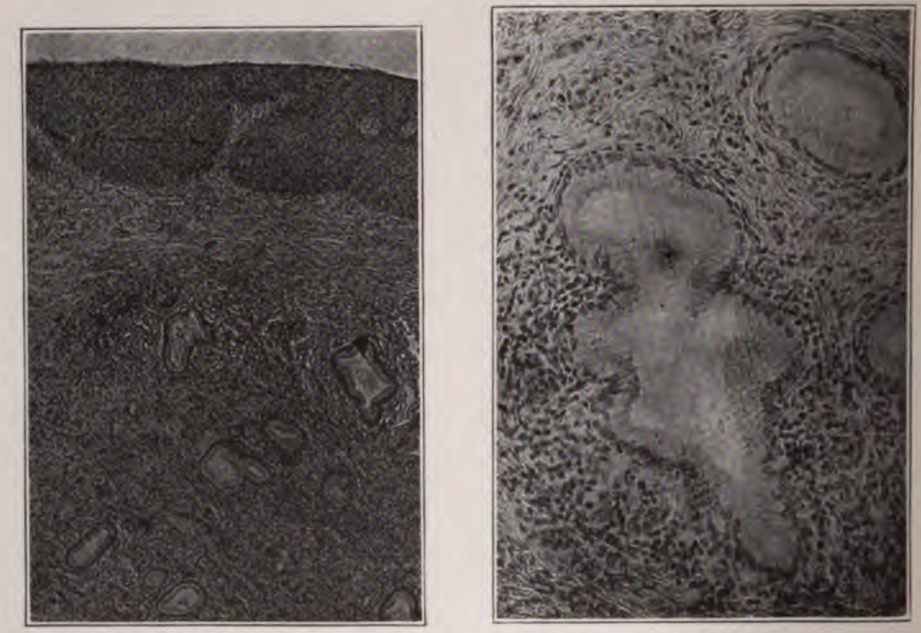


Fig. 454. Fig. 455.

Figs. 454 and 455.—Endocervicitis, chronic. Here the inflammation is more diffuse than in Fig. 452, even extending out under the squamous epithelium of the vaginal surface. Fig. 454 shows the general inflammatory infiltration between the glanrs and out under the squamous epithelium. Fig. 455 is a high power from the same case showing the diffuse round-celled infiltration between the glands. Gyn. Lab.

The long-continued irritation of chronic endocervicitis and cystic disease is probably an important factor in the causation of cancer of the cervix. It may at any time cause infection or reinfection of the upper tract (endometrium and tubes). Again, it may serve as a focus from which bacteria are carried to distant joints and other structures, causing inflammation there.

Symptoms and Diagnosis

The symptoms of chronic endocervicitis are chronic **vaginal discharge** and **erosion** of cervix. Associated with these, but due principally to accompanying lesions (chronic endometritis, laceration of pelvic floor, pelvic inflammation), are a sense of weight and dragging in the pelvis, backache, and pain over the sacrum (supposed to be the seat of reflex pain from the cervix).

Most of the cases of very persistent free leucorrhea are due to chronic endocervicitis.

Chronic endocervicitis must be distinguished from chronic endometritis, laceration of cervix and cancer of cervix.

In chronic ENDOMETRITIS there is usually a history of pain in the lower abdomen and some menstrual disturbance, and often a history of salpingitis. Examination shows the uterus somewhat enlarged and tender. A complicating salpingitis is evidence that the inflammation has involved the body of the uterus as well as the cervix.

In CERVICAL LACERATION, the cervix loses its pyramidal shape and the edges are turned outward and the mucous membrane is everted or replaced by scar-tissue. The cervix is broader and larger than normal and may show two distinct lips. The extent of the tear can usually be better determined by the sense of touch than by sight, but the extent of the eversion of the mucosa is better seen than felt. The two conditions, chronic endocervicitis and cervical laceration, are often associated.

In BEGINNING CANCER of the cervix, there is usually an area of induration. Also, there is a marked tendency to bleed on manipulation and this tendency to bleed is not removed by 10 per cent copper sulphate applications. Later, the discharge becomes offensive and sanguino-purulent and contains small particles (crumbly discharge), but the diagnosis should be made before these marked evidences develop, as it may be too late then to effect a cure. In any case in which there is a suspicion of cancer, a small piece of the tissue should be excised for microscopic examination.

Treatment

In chronic inflammation of the cervix, attention to the patient's general health is important. Marked anemia and lowered vitality from any cause, may predispose to chronic endocervicitis or cause it to persist. Consequently, if such conditions are present, appropriate treatment for the same should be given. Iron, quinine and arsenic are often indicated. The uric acid diathesis, or lithemia, is prone to cause persistence of chronic cervical inflammation. Diseases causing chronic pelvic congestion are especially effective in the same direction, hence measures directed toward the relief of pelvic congestion must be employed. In all cases of endocervicitis the most important step in treatment is to remove the cause of the disease when that is possible. Endometritis or malposition of the uterus should be corrected if present, and the patient should be put on a regular tonic regime.

Locally the steps in treatment recommended for acute endocervicitis are indicated, and also the following additional measures:

1. If there are cysts, puncture and evacuate them and touch the cavities with some antiseptic astringent. Cysts projecting into the canal may sometimes be located with a probe or tenaculum. They should be treated the same as those on the external surface. If necessary for the proper treatment the canal may be dilated. If the external os is too small to permit of good drainage or satisfactory local treatment, it should be opened by dilatation or incision. The contracted cervical outlet, or "pinhole os," is rather frequent in nullipara and causes retention of the secretion and increased irritation. In such a case if the os does not yield readily to dilatation it may be incised. It is sometimes a good plan to curet the entire cervical canal and then apply the desired medicine.

Linear cauterization with the nasal cautery tip is a most effective treatment for chronic endocervicitis with eversion and cystic change. Details of this are given under the treatment of Laceration of the Cervix with Cystic Change (see Fig. 473).

2. If there is considerable laceration and eversion of the cervix, repair may be indicated. This is particularly important if there is hypertrophy or cystic disease. In the denudation for repair, a large part of the cystic portion may be excised.

3. If the cystic disease is still more marked, the cystic area may be excised by the Schroeder method (Figs. 479 to 481) or by the Sturmdorf method (Figs. 482 to 485). This operation removes the cystic and infiltrated tissue on the inner side of the cervical lips and at the same time preserves the outer part of the cervix, which is comparatively normal.

EROSION OF CERVIX

An erosion of the cervix is an area on the vaginal surface of the cervix which is found covered with columnar epithelium, and consequently presents a reddened inflamed appearance. Some confusion has resulted from the application of the term "ulceration of cervix" to this condition. There is no ulcer and no granulating surface, for the whole area is still covered with epithelium.

Etiology and Pathology

The erosion is caused by an irritating vaginal or uterine discharge. The discharge may originate in the vagina (e.g., gonorrheal vaginitis) or in the cervix (endocervicitis) or in the body of the uterus (endometritis). Any condition that gives rise to an irritating discharge may cause an erosion of the cervix.

The reddened area seen in erosion (Fig. 457) is due to the development outside of the external os of a surface-covering that resembles the cervical mucosa, i.e., there is but one layer of cells and they are columnar. This thin epithelial layer permits the underlying vascular tissue to show through, and thus gives the area its red appearance.

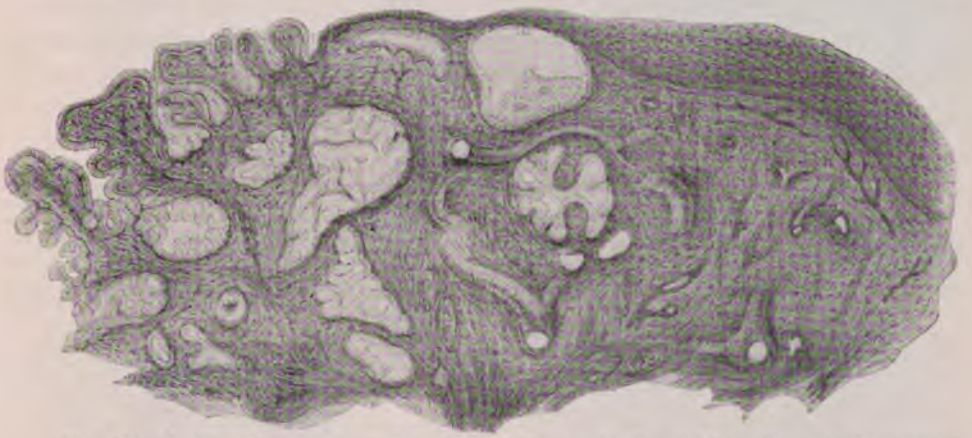


Fig. 456.—Section through an erosion of the cervix. At the right is the normal squamous epithelium covering the vaginal portion of the cervix. At the left is the area of erosion, showing the papillary projections covered with a single layer columnar epithelium. The cavities below the surface are gland cavities somewhat dilated, showing a tendency to cyst formation. (A. Martin—*Atlas of Gynecology.*)

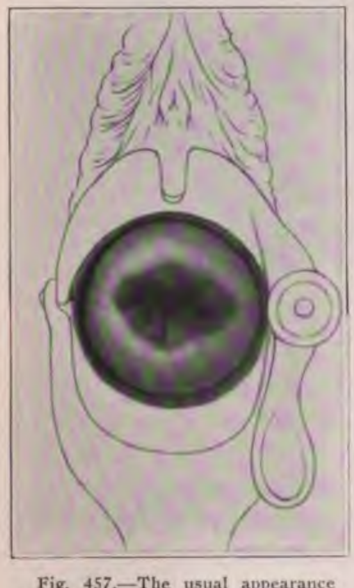


Fig. 457.—The usual appearance of an erosion on a multiparous cervix. The cervix is somewhat lacerated, and around the slightly everted cervical mucosa is the wide, irregular, red area of erosion (dark in the illustration).

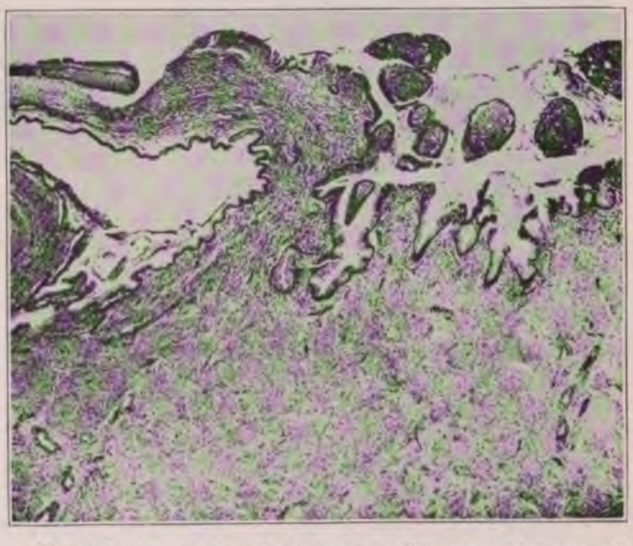


Fig. 458.—An erosion of the cervix. The preserved layer of squamous epithelium appears in the left upper corner; the eroded area, in the right upper half. Gyn. Lab.

On microscopic examination the red patch is found to be covered with a single layer of columnar epithelial cells (Figs. 456, 458). As this epithelial layer proliferates, however, it shows a marked tendency to become much folded, forming deep depressions and tall papillae, a condition known as a

papillary erosion. Not infrequently the tips of the papillae or folds become adherent, forming closed cavities or follicles between them, which become filled with secretion or exudate. This is called a **follicular erosion.**

Just why this columnar epithelium should develop on a surface previously covered with squamous epithelium, is not positively known. It is generally thought to be due principally to the proliferation or outgrowth of the mucosa of the cervical canal beyond the external os, the proliferation being caused by one of the various forms of irritation previously mentioned.

Symptoms and Diagnosis

The symptoms due to the erosion are usually obscured by the symptoms of the causative lesion. The erosion causes some increase in the discharge. The cervix is so insensitive that but little if any pain results. On examination, a mucopurulent discharge is found. When the cervix is exposed, a reddened angry-looking area is seen about the external os, extending outward irregularly and gradually shading into the normal covering (Figs. 457, 459). Though the lesion is superficial, it may bleed when touched.

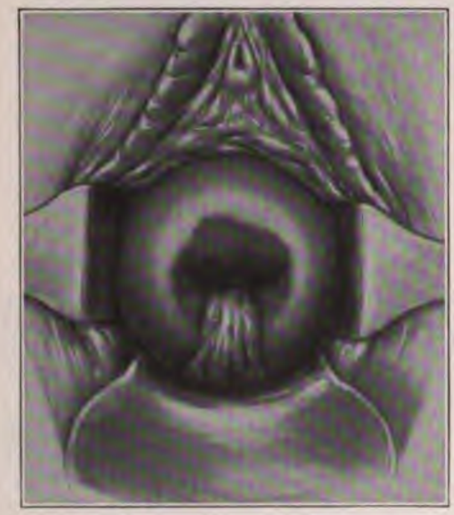


Fig. 459.—Moderate eversion in a nulliparous cervix, from chronic endocervicitis. There is present also the usual erosion and stringy discharge.

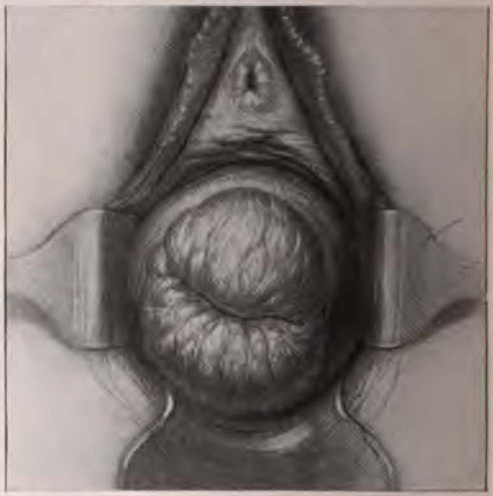


Fig. 460.—Marked eversion, from chronic endocervicitis. There is no laceration of the cervix, the patient being a nullipara. (Cullen—*Cancer of the Uterus.*)

This eversion of the cervical mucosa by inflammation only, without previous laceration, is likely to lead to a mistaken diagnosis of laceration of the cervix. It is also of medico-legal importance, as the appearance of laceration may lead to the erroneous conclusion that the patient has at some time given birth to a child.

The lesions which may be confused with erosion of the cervix are superficial abrasion, ulcer of cervix, and eversion of mucous membrane.

Superficial ABRASION of the vaginal portion of the cervix is a rather rare condition presenting an appearance somewhat like an erosion, but the microscopic appearance is entirely different. Several layers of the epithelium have been rubbed off but the surface is still covered with squamous epithelium. An abrasion is usually due to mechanical effect (pressure of pessary or other foreign body) and does not present the complicated etiology or pathology of erosion. It usually occurs at the point where the pressure comes on the cervix (from pessary or other body) and not especially about the external os, as does the erosion. Its outline is not so well marked and it usually disappears rapidly after the cause is removed.

An ULCER of the cervix presents a clear-cut border, sometimes raised and indurated, and the base of the ulcer is formed by granulation tissue. The different forms of ulcer simple, chancroidal, syphilitic, tubercular, malignant present also special characteristics, which will be given later.

In EVERSION OF MUCOUS MEMBRANE from laceration, the fact that the cervix has been lacerated is apparent, and close examination of the reddened surface will show that it is turned-out endocervical mucous membrane. An erosion of the cervix may coexist with eversion, in fact, the combination is very frequent, the erosion being due to the irritating discharge caused by the laceration and eversion. There may be considerable eversion or even marked eversion without laceration, the turning out of the cervical mucosa being due to the infiltration and swelling from chronic endocervicitis (Figs. 459, 460).

Treatment

1. Remove the cause. If due to the irritation of a pessary, the pessary must be removed for a time. If due to an irritating discharge from the vagina or uterus, the primary lesion (causing the discharge) must receive appropriate treatment.

2. Keep the vagina clean with antiseptic douches taken once or twice or three times daily, the frequency depending on the amount of discharge.

3. Every few days apply some antiseptic astringent, for example, a 10 per cent solution of silver nitrate or protargol or copper sulphate, and then dust in an antiseptic astringent powder and introduce a dry tampon against the cervix. The tampon is to be removed the next morning and the douches continued until the next office treatment.

ULCER OF CERVIX

An ulcer of the cervix is an area on the cervix which has lost its epithelial covering down to connective tissue, the base being formed by granulation tissue or slough, as is well shown in Figs. 461 and 462.

The causes of an ulcer of the cervix are simple irritation (as from a pessary or a very irritating discharge or from rubbing of the clothing when the uterus is prolapsed), chancroidal infection, syphilis, tuberculosis, and malignant disease.

The essential pathology is stated in the definition. It differs from an erosion in that there is a distinct break in the epithelial covering of the cervix.

Symptoms and Diagnosis

The most prominent symptom of ulcer of the cervix is vaginal discharge, which is sometimes streaked with blood. When the cervix is exposed with the speculum the ulcer on its surface comes into view. It may be large or small, superficial or deep. It often bleeds when touched.

The conditions that may be confounded with ulcer of the cervix are erosion of cervix and laceration of cervix with eversion of mucosa. In **erosion** the lesion is very superficial and usually surrounds the external os and the whole surface is still covered with epithelium. The cause is usually apparent and there is no raised clear-cut border or sunken base. In **laceration** of cervix with eversion of mucosa, the laceration is apparent, and by clearing all secretion from the reddened surface and examining it closely, it can be seen that it is mucous membrane and not granulation tissue.

After the diagnosis of ulcer is established, the next step is to determine **what kind** of an ulcer it is. A rapidly spreading ulcer with undermined or punched-out edges, following suspicious intercourse, is probably chancroidal. A chronic ulcer resisting treatment is either syphilitic, tuberculous or malignant. If syphilitic, there will be other evidences of syphilis and spirochetes may be recovered from its surface. It must be remembered that not so rarely a primary chancre may be located on the cervix. If tuberculous, scrapings from the surface or sections of tissue will show tubercle bacilli. A malignant ulcer, that is, an ulcer due to the breaking down of malignant infiltration, usually presents a wide area of infiltration about the ulcerated portion. It shows also a decided tendency to bleed and the bleeding is not stopped by

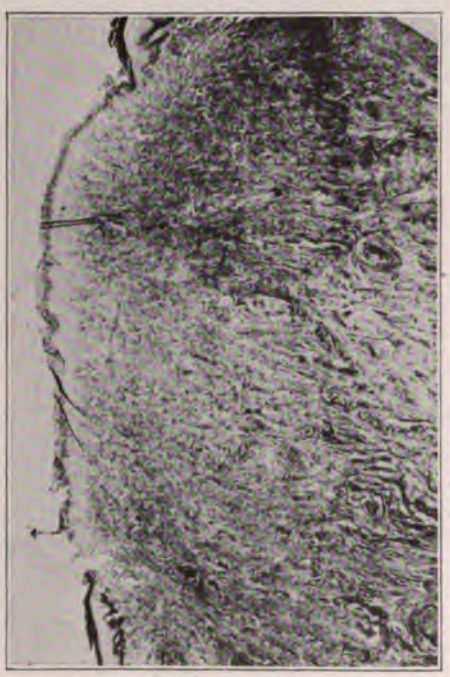


Fig. 461.—An ulcer of the cervix. Squamous epithelium is seen at upper and lower end but is absent over the surface of the ulcer between. Gyn. Lab.

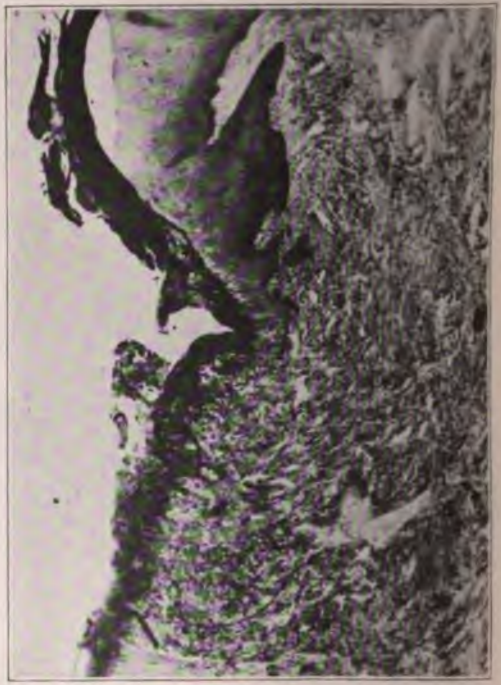


Fig. 462.—Upper end of section shown in Fig. 461, under higher magnification. The layer of squamous epithelium terminates abruptly at the edge of the ulcer. Gyn. Lab.

the repeated application of 10 per cent copper sulphate solution. If the patient is aged, that increases the probability of the trouble being malignant. Any chronic ulcer resisting treatment without apparent cause (persistent irritation, syphilis or tuberculosis) is probably malignant, and should have a piece excised for microscopic examination, that malignant disease may be excluded or proved.

Treatment

The treatment depends, of course, on the character of the ulcer.

In **simple ulcer.** If due to a pessary, remove the pessary and give a hot antiseptic douche two or three times daily, depending on the amount of discharge. Also every other day or every third day, introduce the speculum, expose the ulcer, make an application of copper sulphate (10 per cent) or some other astringent, and then dust on an antiseptic astringent powder and introduce a tampon to hold the powder in place against the cervix. The tampon is to be removed the next morning and the douches continued until the next office treatment.

A chancroidal ulcer which spreads in spite of the measures mentioned under simple ulcer, should be cauterized deeply with carbolic acid and then treated the same as a simple ulcer.

In **syphilitic ulcer** the patient should receive constitutional treatment. The local treatment is about the same as for simple ulcer.

A **tuberculous ulcer** without decided tuberculosis elsewhere, should be excised if its situation will admit. If it cannot be excised, it should be thoroughly curetted and cauterized deeply with carbolic acid or nitric acid or lactic acid or the thermocautery. After cauterization, the treatment is the same as for simple ulcer, except that the use of iodoform is especially indicated. If the ulcer extends some distance up the cervical canal or is associated with tuberculosis of the endometrium or fallopian tubes, hysterectomy, vaginal or abdominal, is indicated, provided, of course, that there is no other lesion contraindicating such a course. At the same time, internal antituberculous remedies are indicated.

If the ulcer is **malignant** (carcinoma or sarcoma) the uterus should be removed at once.

If the character of the ulcer is **doubtful,** and remains so after a short course of treatment, excise a piece of tissue from the margin of the ulcer and submit it to a pathologist for microscopic examination.

LACERATION OF CERVIX UTERI

Etiology

The usual cause of laceration of the cervix is the passage of the head and shoulders of the child in **labor.** The cervix will stretch wonderfully when softened by pregnancy and slowly dilated by the bag of waters, but still there is nearly always some laceration.

In **operations** on the nonpregnant uterus, such as curettage, the cervix is occasionally torn in the preliminary dilatation.

A **congenital split** resembling a lateral laceration of the cervix has, in a few instances, been observed in the newborn infant. This congenital notch is of little importance except that when seen in the adult it may lead to an erroneous diagnosis of previous pregnancy. A distinct laceration of the cervix is one of the strongest proofs of previous pregnancy and the fact that a congenital notch somewhat resembling a laceration may occur, is of medicolegal importance. Also, it must be kept in mind that chronic endocervicitis may produce a condition resembling an old laceration (Fig. 460).

Pathology

The tear of the cervix in labor usually affects both sides causing a **bilateral laceration** (Figs. 467, 468), with one side torn deeper than the other.

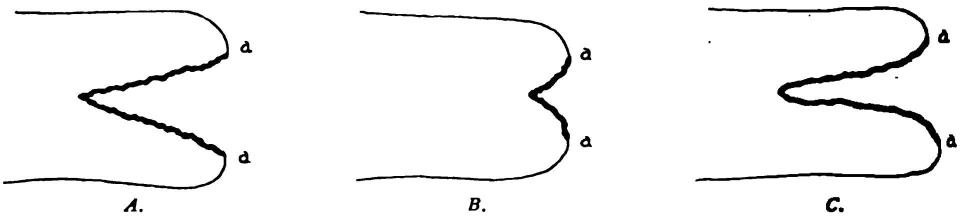


Fig. 463.—Illustrating different conditions in laceration of the cervix. *A*, Fresh laceration with the unchanged lips separated. *B*, Practically healed laceration of cervix, only a small notch remaining. *C*, deep notch with two lips remaining, but the lips are not thickened. Such a cervix rarely causes trouble or requires repair.

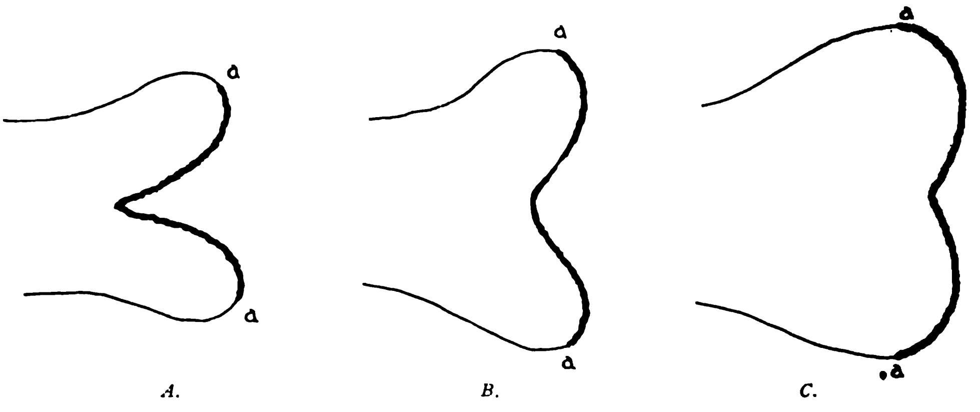


Fig. 464.—Different conditions in laceration of the cervix. *A*, Deep notch with thickened lips and beginning eversion. *B*, More thickening of lips and marked eversion. *C*, Marked infiltration and thickening of lips with complete eversion, forming the "ball-shaped" cervix (see Figs. 83, 84).

Occasionally only one side is torn giving a **unilateral ulceration** (Figs. 79, 466). Sometimes the cervix is torn in several directions giving a **stellate laceration** (Figs. 469, 470). Still another variety is the **internal laceration**, a tear not extending entirely through the wall.

Tears of the cervix are of all grades of severity. The tear may be very slight, leaving after some weeks, only a small notch or depression (Fig. 463), or it may be very deep, even extending into the vaginal and pericervical connective tissue or into the bladder. In the deep tears, the lips may fall together and heal fairly well so that only a small notch is left. On the other

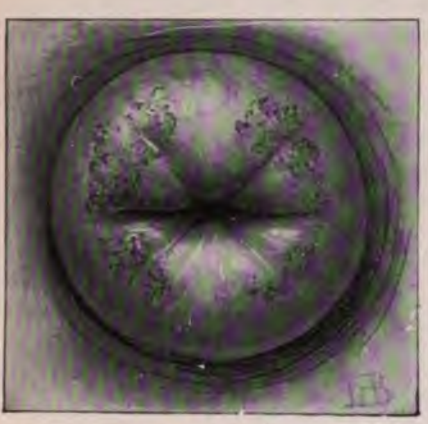


Fig. 465.—A lacerated cervix in which there is so much eversion that the cervix appears as a round ball. (Kelly—*Operative Gynecology.*)

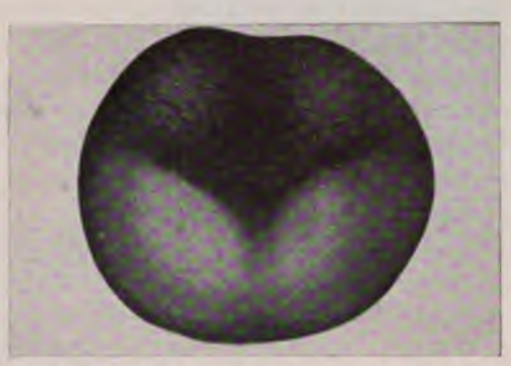


Fig. 466.—Unilateral laceration of the cervix, with considerable thickening and eversion. (Mann—*American System of Gynecology.*)

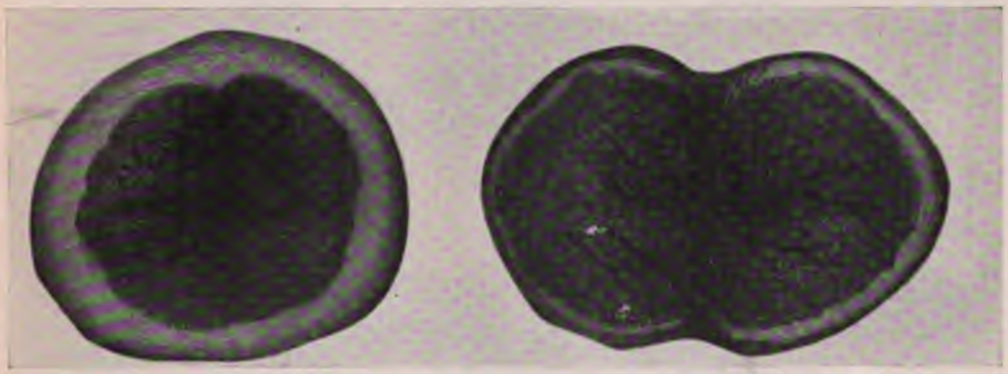


Fig. 467.

Fig. 468.

Figs. 467 and 468.—Bilateral lacerations of cervix. Fig. 467 shows marked bilateral laceration, with distinct lips rolled out. Fig. 468 shows an unusually deep bilateral laceration extending to the vaginal vault. (Mann—*American System of Gynecology.*)

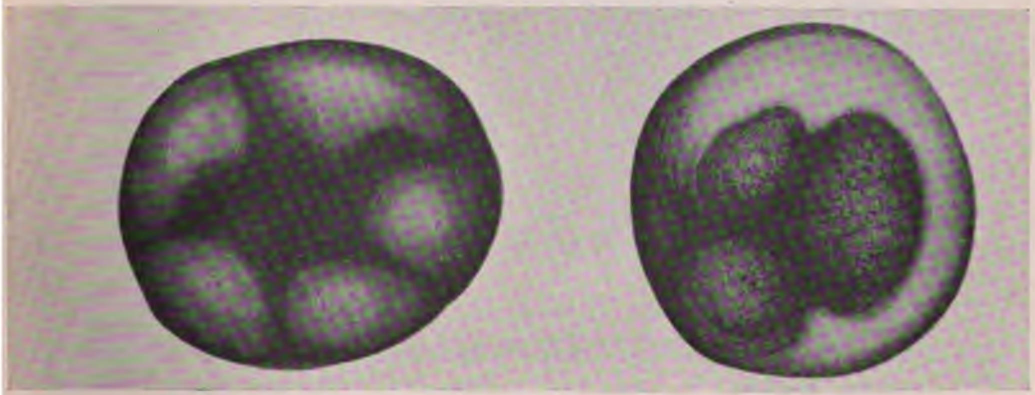


Fig. 469.

Fig. 470.

Figs. 469 and 470.—Deep stellate lacerations of the cervix, with resulting thickening and eversion. (Mann—*American System of Gynecology.*)

hand, the lips may fail to unite in which case a deep notch may be left (Figs. 463, 464). Occasionally the cervix heals in such a way as to leave a fistula from the cervical canal into the vagina (cervico-vaginal fistula). In the case of an "internal laceration" the cervix may appear to be simply dilated. It is open or patulous and the examining finger may, in some cases, be introduced as far as the internal os. In this form of tear, the conical shape of the cervix may be preserved if no marked inflammatory change has taken place.

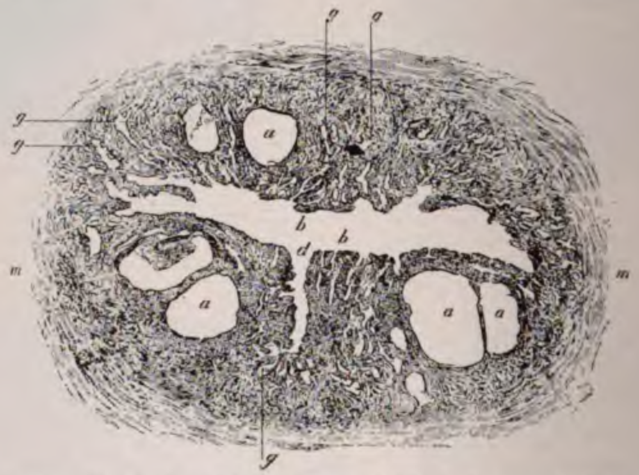


Fig. 471.—Cross section of a cervix which is the seat of "Cystic Degeneration." *a*. Dilated gland cavities, forming small cysts. *b*. The cervical canal. (Pryor, after Cornil—*Pelvic Inflammation*.)

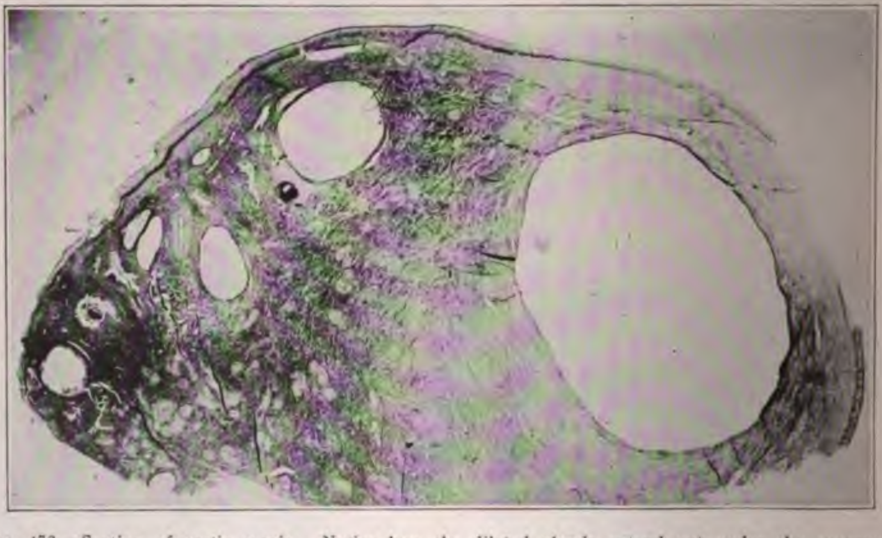


Fig. 472.—Section of cystic cervix. Notice how the dilated glands extend out under the squamous epithelial layer. Gyn. Lab.

In the ordinary bilateral laceration which fails to unite there is **eversion of the cervical mucosa.** The mucous membrane lining the cervix is turned out (Figs. 464 to 467) and is irritated by rubbing against the vaginal wall. The irritation of the cervical mucosa causes **increased secretion** from the cervical glands. Infection leads to **endocervicitis,** acute and chronic, and this inflammation may bring about destruction of the mucous membrane, which is then replaced by scar-tissue. The rolling out of the lips of the cervix may progress to such an extent that the notch between the lips, which is one of the signs of laceration, is obliterated—so that the cervix appears as a round ball (Figs. 464, 465, 83, 84).

Frequently there is much **scar-tissue** covering the inner portions of the cervical flaps, and a thick wedge of scar-tissue in the angle of the tear on each side. The ducts of the cervical glands become obstructed by the inflammation and scar-tissue contraction and small cysts are thus formed, causing nodules in the cervix (Figs. 471, 472). These small cysts feel like shot of various sizes in the cervix. This indurated and nodular condition may lead to an erroneous diagnosis of malignant infiltration. If these nodules be punctured and then pressed upon, a thick glairy mucus is extruded, leaving a small cavity. In some cases, the cervix is riddled with these cysts, a condition known as **cystic degeneration** or cystic disease of the cervix. **Subinvolution** of the uterus is a secondary result of laceration of the cervix. The uterus remains large and heavy and drags on its supports. Another secondary change is **hypertrophy** of the cervix. Owing to the chronic inflammation and chronic congestion and the cystic disease, the cervix gradually enlarges and becomes heavy and sinks downward and forward in the pelvis.

In some cases, however, the supposed enlargement and elongation is only an **apparent hypertrophy.** Even in the cases in which there is considerable hypertrophy it appears to be more than it really is. This deceptive condition is due to eversion of the lacerated portion of the cervix and descent of the uterus and reduplication of the vaginal wall. That this is the true condition may be shown by putting the patient in the knee-chest posture, when the uterus will gravitate out of the vagina toward the abdominal cavity and the point of attachment of the vaginal wall to the cervix, and the amount of cervix below that, may be seen. Another fact brought out by this examination in the knee-chest posture is that there are many cases of **laceration of the vaginal vault** that appear, in the ordinary examination, to be laceration of the cervix only. Owing to the sinking of the uterus and reduplication of the vagina, the tear appears to be wholly in the cervix. When the patient is put in the Sims posture, or better still the knee-chest posture, it is seen that the tear extends past the cervix and involves the vaginal vault.

Still another effect of a deep cervical laceration and the chronic irritation resulting therefrom, is the predisposition to the development of **cancer** of the cervix. Again, persisting infection in the cervix is a focus from infection which may be carried to distant tissues.

Laceration of the cervix as seen several months or years after the injury is usually accompanied by one or more **camplications,** such as chronic endometritis, retroversion, or loss of support in the pelvic floor.

Symptoms and Diagnosis

The symptoms depending on the laceration itself and on the resulting subinvolution and inflammation are numerous, though none are distinctly characteristic of cervical laceration. The symptoms are nearly all due to the complications rather than to the tear itself.

There is usually a **vaginal discharge**, or leucorrhea, due both to the cervical injury and the accompanying endometritis. When there is a preponderance of cervical secretion in the discharge, it is jelly-like and sticky and may be pulled out into long threads, and it is hard to detach from the cervical canal.

Menstrual Disturbances usually accompany laceration of the cervix, but they are due largely to the subinvolution and endometritis. They consist of painful menstruation and increased menstrual flow.

Backache and **dragging pains** in the pelvis are usually present in severe laceration but they, like the menstrual disturbances, are to be attributed largely to the complications such as laceration of pelvic floor, subinvolution, endometritis, and salpingitis.

Dyspareunia may be present in a case of laceration of the cervix and the probability of its occurrence is increased if retroversion is present.

Sterility may be caused by a cervical tear, the increased secretion retarding the progress of the spermatozoa or the cicatricial contraction causing stenosis. **Abortion** occasionally results from an old cervical injury and in cases of very deep tears, the abrasions may reoccur habitually.

Reflex Symptoms in distant organs are sometimes excited by cervical injury. A familiar example is the increased nausea and vomiting of pregnancy, often seen in cases of severe laceration and irritation about the cervix. In many of these cases the cervix is tender, and pressure upon it excites stomach distress. In most of such cases an application of silver nitrate solution (4 per cent) or cocaine solution (10 per cent) to the cervix will give much temporary relief, indicating that the trouble is reflex from the sensitive cervix. Among the reflex disturbances sometimes due to a lacerated cervix, come also stomach disturbances in the nonpregnant, persistent neuralgia and headaches (particularly headache at the vertex) and a general nervous irritability.

The reflex influence of cervical injuries has no doubt been greatly overestimated by some writers, and affections have been attributed to such injuries that really had no connection with them or were at most only aggravated by them. Laceration of the cervix is frequently accompanied by **poor general health** which is usually due to some complicating disease. The possibility of distant joint inflammations from the infected cervix as a focus must be kept in mind.

On vaginal examination the **notch** in the cervix may be distinctly felt (Figs. 77 to 81) and also the enlargement and the cystic condition when present. If there is a deep tear, the anterior and posterior **lips** may be made out. When the cervix is exposed to view through a speculum the amount of **eversion** of the mucous membrane may be seen and also any area of **erosion** caused by the irritating discharge. [illegible] may distort the cervix and make it appear somewhat [illegible] and changed in shape than it really is. [illegible] is not of much importance ordinarily, may be avoided by using the Sims posture and the Sims speculum.

In some cases the flaps have rolled outward so far that neither notch nor distinct flaps can be seen. The cervix appears simply as a round ball (Figs. 464, 465) instead of showing two distinct lips. By catching each side of such a cervix with a tenaculum forceps, near the point that was formerly the external os, and bringing these points together (Figs. 83, 84), it may be seen that the cervix has been torn into two lips, and also some idea may be gained of the depth of the tear and the appearance of the cervix when repaired.

Laceration of the cervix with chronic inflammation must be distinguished from the following conditions:

a. Erosion of the cervix. In simple erosion, the conical shape of the cervix is preserved. An erosion is often present with laceration as a result of the irritating discharge. It then appears around the everted mucosa as an irregular reddened inflamed-looking area.

b. Ulcer of cervix. In ulcer without laceration the conical shape of the cervix is preserved. Also, an ulcer shows destruction of the epithelial covering and has a depressed base and raised margin.

c. Chronic endocervicitis without laceration. In most severe cases of chronic endocervicitis, there has been laceration. But there are certain cases of endocervicitis without laceration, in which the mucosa becomes pushed out and everted from the inflammatory swelling, and the condition has somewhat the appearance of laceration. Such an appearance has led to an erroneous diagnosis of previous pregnancy. In these cases the cervix as a whole preserves its conical shape, the principal disturbance being about the external os, which may appear as a slit instead of as a round opening and may be surrounded by swollen everted mucosa.

d. Cancer of cervix. Usually the differential diagnosis is easy. In some cases, however, when the cervix is deeply torn and nodular from cysts, it may be impossible to exclude cancer without a microscopic examination of an excised piece from the suspicious area.

With a lacerated cervix are frequently found one or more **complications**—chronic endocervicitis or subinvolution or chronic endometritis or retroversion or prolapsus uteri or chronic salpingitis or chronic pelvic cellulitis or chronic oophoritis as distant joint inflammations.

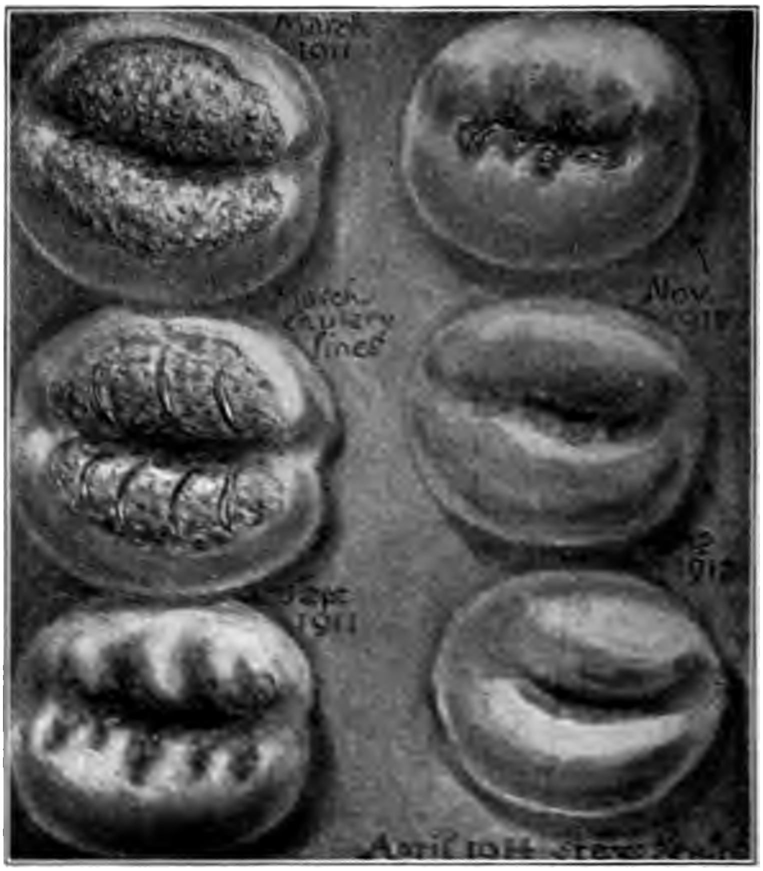
All the lesions present in a case should be determined as far as possible before operative treatment is undertaken, for some of them may require treatment at the same time.

Treatment

A laceration of the cervix does not necessarily cause symptoms or require treatment. It is only when accompanied by inflammation of cystic change or other troublesome complication that treatment must be instituted.

For complicating erosion a few applications and astringent douches may be sufficient. When the lacerated cervix is the seat of chronic endocervicitis and erosion and cystic change, repeated cautery treatment with small nasal cautery tip is very effective in bettering the condition.

The subject of **linear cauterization** of the cervix has been presented most helpfully by Dickinson (Am. Jour. Obst. and Gynec., December, 1921). With the small tip, two or three fine lines of cauterization are made on each everted lip as indicated in Fig. 473. These are repeated at intervals of one or two weeks, giving time for the reaction to subside between treatments. These treatments are repeated until all cysts are destroyed and the eversion and swelling of the cervix have largely disappeared. This linear cauterization with



[illegible] erosion and granular [illegible] From [illegible] and shrinkage [illegible] and

[illegible] and can be carried [illegible] of the more severe [illegible]

[illegible] is likely to persist [illegible] or excision of [illegible]

Trachelorrhaphy

The operation for repair of a lacerated cervix is known as "trachelorrhaphy." It was devised by Emmet and, together with Emmet's operation for repair of the pelvic floor, stands as a representative of the careful study given to pelvic diseases by that splendid clinician.

Indications.—A lacerated cervix when examined after several months or years, may present either of the following conditions:

a. A small notch on one or both sides, the remainder of the cervix being normal. Such a cervix does not require repair, as it causes no symptoms.

b. A deep notch on one or both sides, the lips being soft and of normal size and without irritation (Fig. 463). Such a cervix does not ordinarily cause any disturbance. Occasionally, however, the scar-tissue in one or both angles causes local tenderness and reflex disturbance. In such a case the laceration should be repaired.

c. The cervix presents large infiltrated lips, with everted mucous membrane, cystic formation, an irritating discharge and spots of erosion (Figs. 467 to 470). There may be no well-defined flaps or lips, simply a globular appearance of the swollen cervix (Fig. 465) with a slit-like os, surrounded by an irregular area of everted mucosa, granulation spots and scar-tissue, the whole covered more or less with a mucopurulent discharge. Such a cervix should be repaired, not only on account of the troublesome symptoms resulting from it, but also because it predisposes to development of cancer.

It must be emphasized, however, that the simple fact that a cervix has been lacerated is not an indication for operation. Operation is indicated only when there are troublesome local conditions which other measures fail to relieve.

Contraindications.—The contraindications to this operation are the same as the contraindications to repair of the pelvic floor (see Chapter V).

Preparations.—The preparations for the operation may be divided into preparation of patient, preparation of instruments and dressings, and preparation of operator and assistants. The **preparation of the patient** is both local and general. When the cervix presents erosion or ulceration or cysts or marked infiltration or a purulent discharge, it should be subjected to preparatory treatment as follows:

a. Give a hot antiseptic douche two or three times daily.

b. Puncture the cysts and touch the cavities with strong silver nitrate solution or other antiseptic.

c. When there is marked congestion and infiltration, bleed the cervix by multiple punctures once or twice weekly. Draw off one or two tablespoonfuls of blood each time and follow the bleeding by a tampon soaked in boroglyceride or ichthyol-glycerin. Direct the patient to remove the tampon in twelve to twenty-four hours and then continue the hot douches until the next office treatment. By this method the cervix, in the course of a few weeks, may be reduced considerably in size and put in much better condition for repair.

d. Treat the complications, such as retroversion and endometritis.

e. Give laxatives and tonics as necessary to put the patient in good condition generally.

f. Before operating for repair of the cervix the patient should be carefully examined, that all lesions present may be determined and taken into consideration in the treatment and prognosis. It may be found that the laceration of the cervix is only a small part of the patient's trouble and that her principal symptoms are due to malposition of the uterus or to loss of support in the pelvic floor or to endometritis or to salpingitis or to appendicitis or to a pelvic tumor. Many bitter disappointments and so-called failures have followed this operation, and other operations also, because the operation was expected to remove symptoms that were really not dependent on the lesion attacked. Such a mistake may be avoided by examining the patient carefully, and giving to each lesion present its due importance in the production of the complex clinical picture.

Another reason for ascertaining carefully all lesions present is that some other lesions may be corrected at the same time that the cervix is repaired, for example, the uterus may be curetted or a malposition corrected or the pelvic floor repaired.

In preparing for the operation on the cervix avoid the menstrual flow for ten days after the operation—the best time for the operation being four to ten days after menstruation.

The antiseptic preparation of the patient is the same as for repair of pelvic floor.

The **preparation of instruments and dressings** is the same as for Abdominal Section. The instruments required for trachelorrhaphy are shown in Figs. 474 and 475.

The **preparation of the operator and assistants** is the same as for Abdominal Section (see Chapter XVI).

Steps in the Operation.—After the patient is anesthetized and brought to the edge of the table (Fig. 503) and the vagina scrubbed the same as for curettage, then proceed by the following steps:

1. Make a careful bimanual examination, under anesthesia, of the uterus and tubes and ovaries. When the bimanual examination is finished, introduce the vaginal retractor and expose the cervix and catch it with a tenaculum forceps.

2. If chronic endometritis or subinvolution is present, curet the uterus. When the cervix is to be repaired immediately after curettage, no gauze need be placed in the uterus.

3. Outline, by incision with the bistoury, the area to be denuded, leaving in the center of each lip a strip about a third of an inch wide, to form the new cervical canal (Figs. 476, 478). The strip of tissue to be left should be wide enough so that no stricture will result, after the healing and involution. Watch this point particularly, as some stenosis, requiring dilatation, sometimes follows trachelorrhaphy. It is a good plan to leave the strip a trifle wider at the external os.

The area of denudation should include all the area of everted mucous

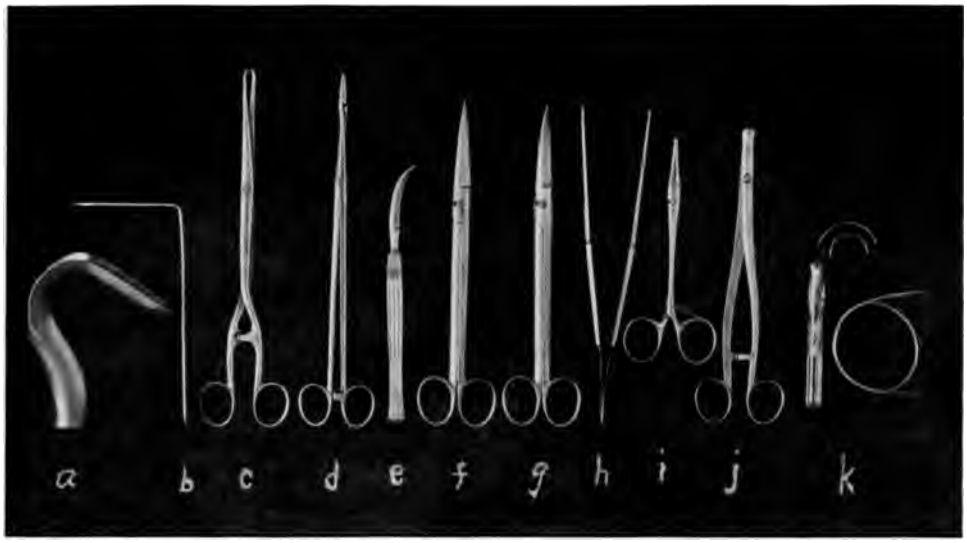


Fig. 474.—Instruments for repair of the cervix: *a*, Edebohl's self-retaining speculum, to which the required weight is attached by a small hook; *b*, right-angled vaginal retractor (have two); *c*, long tenaculum forceps (have two); *d*, vaginal dressing forceps for sponging (have two); *e*, bistoury; *f*, long straight scissors; *g*, long curved scissors; *h*, long tissue forceps; *i*, hemostat forceps (have eight); *j*, Sims' needle-holder; *k*, number 2, 20-day catgut (have six tubes) and silkworm-gut (have eight strands) and strong cervix needles (have four). These needles should have sharp trocar-points, so as to easily penetrate the hard tissue of the cervix.

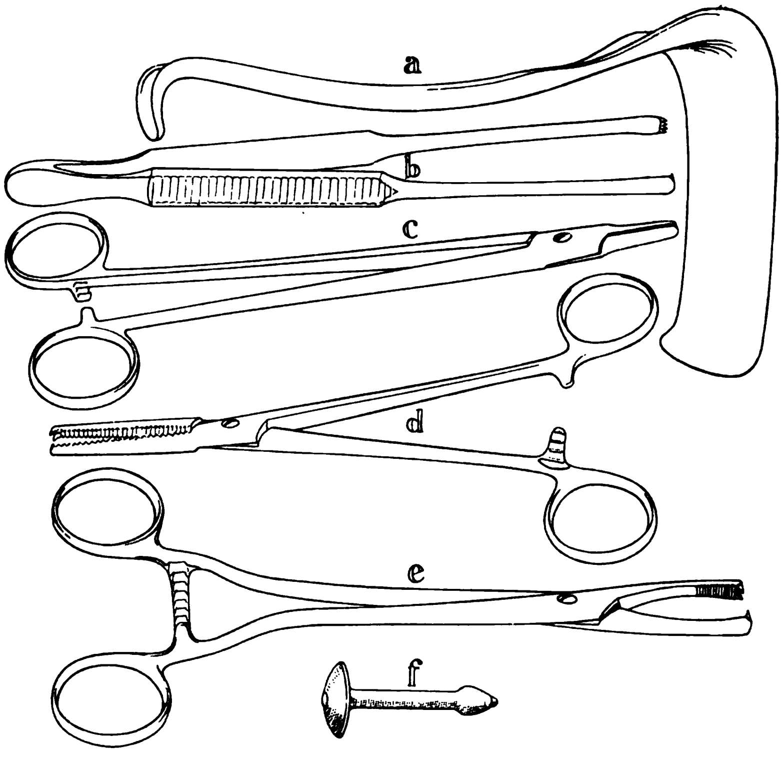


Fig. 475.—Supplementary instruments, that are found useful in repair of the cervix: *a*, retractor; *b*, tissue forceps with serrated jaws; *c*, an improved type of Sims needle-holder; *d*, rat-toothed hemostatic clamp, which takes hold of the firm tissue of the cervix; *e*, an improved tenaculum forceps for cervix; *f*, uterine stem, to be left in the canal after cervix operations to insure preservation of a good canal and prevent stenosis.

membrane and scar-tissue, and should extend slightly outward on the vaginal surface of the cervix so as to give a wide surface of denudation for approximation.

4. Denude. A very good way is to first make an incision deep in the angle of each side (Fig. 478). This should extend through the scar-tissue into healthy tissue. Then catch the lower angle of the strip to be removed from one side of the lower lip and, while holding this with the tissue forceps, clip it loose with the scissors, straight or curved as preferred (Fig. 478). This process of cutting is continued all the way to the base of the flap. The upper part of the same side of the cervix is treated the same way, and then the other

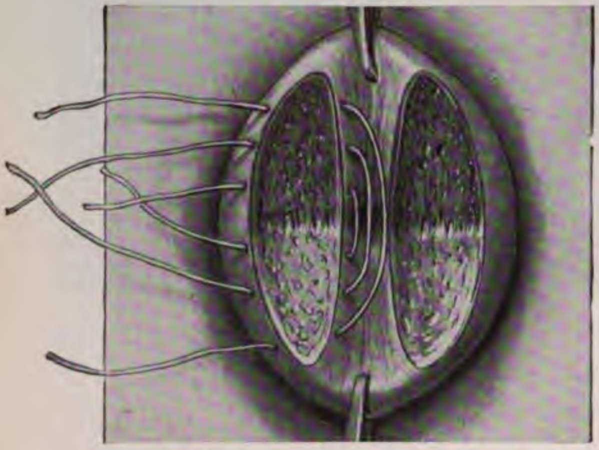


Fig. 476.—Repair of lacerated cervix, showing area of denudation and method of placing sutures. (Kelly—*Operative Gynecology*.)

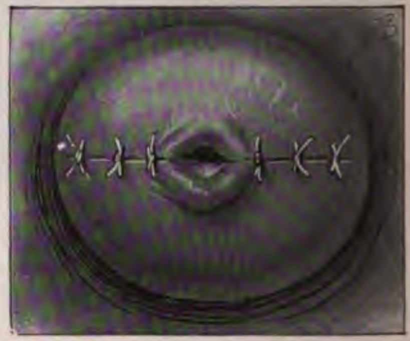


Fig. 477.—Repair of lacerated cervix. Sutures tied on both sides. Catgut sutures only are here used, hence they are all cut short. (Kelly—*Operative Gynecology*.)

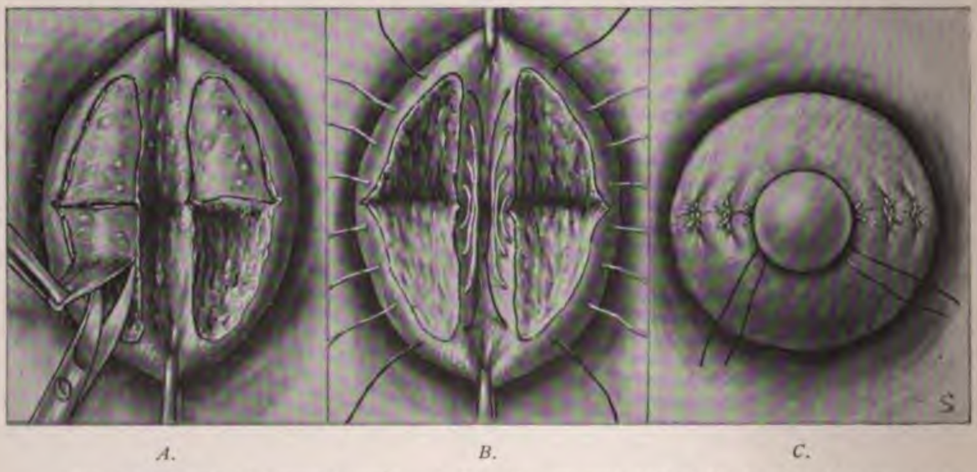


Fig. 478.—Repair of lacerated cervix. *A*, Denuding on each side of the canal, with more or less excision of cysts and infiltrated tissue. For this a knife or scissors may be used. A very convenient way is to start the process with the knife and finish with scissors. *B*, All sutures passed and ready to be tied. *C*, All sutures tied and the stem in place. Notice that the silkworm gut suture on each side is cut long, for when cut short the ends stick like wire. The stem is left in two weeks, when it is extracted and the silkworm gut sutures removed.

side of the cervix. Beginning below diminishes the inconvenience from the bleeding. Special care should be taken to remove all scar-tissue from the angles. Cysts in the area of denudation should be excised. If the surfaces are brought together with cysts in them, the operation is liable to do more harm than good, as the cysts may continue to develop in their buried situation and produce reflex disturbances. If cystic areas cannot be readily excised so as to permit good approximation for trachelorrhaphy, the areas of cystic degeneration should be removed as explained later.

5. Introduce the sutures. After the denudation is complete, the cervix is cleansed with the antiseptic solution, and the sutures are passed. The first suture is introduced at the upper angle of the wound, as shown in Figs. 476 and 478. As each suture is passed its ends are caught in a hemostatic forceps and held out of the way. The next suture is passed one-fourth to one-third of an inch below the first, and so on down to the end, as many as are needed for that side. The sutures on the other side are then passed in the same manner. When all the sutures are in place the cervix is washed off with the antiseptic solution and all clots are carefully sponged away from the angles of the tear. The sutures are then tied, beginning with the one first passed. All the sutures of one side are tied and then those on the other side (Fig. 477). The line of approximation is then examined to see whether any superficial sutures are needed. Frequently one or two superficial sutures will be needed to secure accurate approximation. The stem is then introduced all the way (Fig. 478-C) and the silkworm-gut sutures are cut long—about an inch from the knots. If the silkworm-gut ends are cut shorter they are likely to stick the vaginal wall and cause irritation. If after denudation there is much bleeding from the denuded angle of the tear, the suture at the angle may be tied as soon as passed.

6. Replace the uterus. The uterus is necessarily pulled down a good deal during repair of the cervix and the fundus may have gone backward. After the cervix is repaired the retractor should be removed and the uterus replaced to its normal position by bimanual manipulation (Fig. 508).

For suture material in the cervix, the author prefers silkworm-gut, except when the pelvic floor is to be repaired at the same time. When an absorbable suture is desirable, and 40-day chromicized catgut is satisfactory. No suture is advisable here that will not remain at least ten days in the mucosa. Even when the pelvic floor and cervix are repaired simultaneously, it is often just as well to use silkworm-gut in the cervix and leave it in place four to six weeks. When the pelvic floor is firmly healed, place the patient in the Sims posture, carefully introduce the Sims speculum and remove the cervical sutures.

When there is a **stellate laceration,** the expedient to be adopted depends on the situation and extent of the lacerations. If the principal laceration is bilateral, the other being slight and consequently of little importance, the latter may be disregarded. If the third laceration is deep and close to one of the lateral tears, the small intervening piece of tissue may be excised and the laceration converted into a simple bilateral one, which is repaired in the usual way. When the third tear is deep and near the center of the anterior or the posterior lip, it may be denuded and repaired first, and then the lateral tears repaired as usual. Sometimes in a bilateral laceration there is a marked **disproportion between the lips,** one lip being much larger than the others, making accurate approximation impossible by the usual means. When the difference is not marked it may be equalized by extending the angle of excision into the longer lip. When the disproportion is marked, a wedge-shaped piece may be excised from the longer lip and the wound closed, and then the two lips approximated by the ordinary operation. Another method is to trim down the large lip by cutting the end and sides and inner surface. That, of course, leaves no mucous lining for the new cervical canal. However, an extra width of lining for the new canal is left on the other lip and this prevents union of the surfaces where the canal should be. If the lips are greatly hypertrophied from cystic disease, partial amputation, as described below, is preferable to trachelorrhaphy.

After-treatment.—The genitals should be kept covered with a large sterile dressing of cotton or gauze. Do not catheterize the patient unless there should be retention of urine.

A bowel movement should be secured the second or third day, and daily after that. The gauze packing may be left in two days. It is then removed, and thereafter a lysol douche (¼ per cent) given once or twice daily, depending on the amount of discharge.

After the first week, the patient may be allowed to get up and walk about, as rest in bed after the first few days is not necessary for the healing of the cervix. In many cases, however, it is best to keep the patient in bed longer for the benefit of associated diseases. In "run-down," nervous and worn-out women, this combination of the rest-cure with the operation is of great benefit, and in some of them the rest in bed with good nourishment and relief from care, probably contributes as much as the cervical repair to the improvement attained.

The sutures are removed in two weeks. The most convenient way to remove the sutures is to place the patient in the Sims posture, introduce the Sims speculum, expose the cervix, catch an end of a suture with forceps, pull it down until the knot comes into view or can be felt with the point of the scissors, and then cut the loop. When it is supposed that the sutures are all out, remove the speculum, place the patient in the dorsal posture and make a digital examination to see whether all the sutures are really out. A suture missed by inspection is easily felt in the digital palpation.

Sexual intercourse should be postponed till six weeks after the sutures are removed.

Failure to secure the desired result from the operation may be due to:

1. Want of necessary preparatory treatment.

2. Infection, which of course spoils the operation and may lead to serious periuterine inflammation.

3. Insufficient removal of the scar-tissue in the angles, or the leaving of cysts somewhere in the area of denudation.

4. Too much encroachment upon the area left for the cervical canal, causing subsequent stenosis with retention of contents and dilatation above the constricted area.

5. An incomplete diagnosis. Trachelorrhaphy will not relieve the symptoms of lacerated pelvic floor, prolapsus uteri, adherent retroversion, chronic salpingitis or the various other diseases that may exist in the pelvis. To operate for a lacerated cervix without a thorough examination and diagnosis, as is done in some cases, is to invite failure and disappointment.

The physician is often asked whether the cervix will not tear again at the next labor. It may and it may not. Very frequently it does not tear to any considerable extent. If it does tear, it may be repaired at once, if desired.

Excision of Cystic Area

When many small cysts have formed in the everted and infiltrated surfaces of the cervix, as indicated in Figs. 479 and 480, excision of the cystic area (partial amputation of the cervix) is preferable to regular trachelorrhaphy. Of course, when there are only a few cysts they may be removed in the regular denudation for repair, but when the "cystic degeneration" is extensive, excision of the whole cystic area is advisable. The line of excision is made superficial or deep, as necessary to include the cystic portion of the cervix.

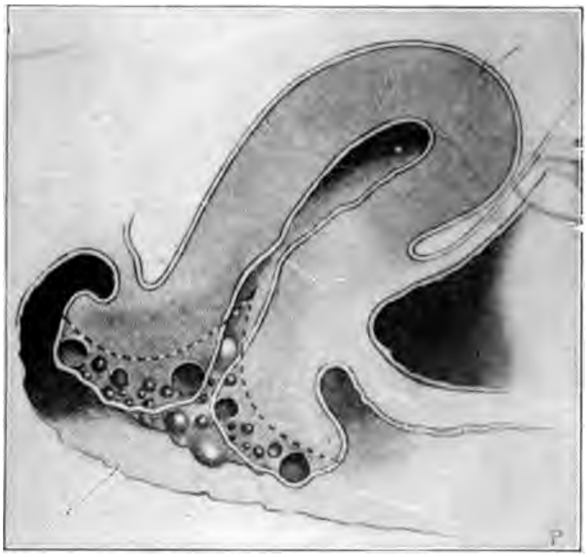


Fig. 479.—Representing cystic degeneration of the cervix. This shows also a line marking the area to be excised. (Dudley—*Practice of Gynecology.*)

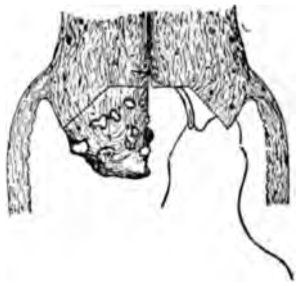


Fig. 480.—Showing the line to follow in excision of the cystic area—called also "Schroeder's Operation." (Pryor—*Gynecology.*)

The preparations are the same as for trachelorrhaphy and the instruments are the same. The steps in the operation vary, depending on which of the two methods of excision is employed. In the older method, long known as the Schroeder operation, the cervix is split laterally and the cystic area excised from each lip separately. In the newer method (conical excision) the cystic area is excised as a cone and the healthy mucosa is drawn over the raw surfaces by special suturing.

Schroeder Method

When the cervix is exposed with the speculum, it is grasped with tenaculum forceps, one being fastened in the anterior lip and the other in the posterior lip. The cervix is then split on each side, sufficiently to permit access to the cystic area of each lip. In a deeply-lacerated cervix this may not be needed. An incision is then made across the inner surface of the base of the anterior lip, extending through the diseased layer. An incision is then made across the front margin of the anterior lip and is continued down in the cervical tissue to the other incision just mentioned (Fig. 481-A).

The tissues lying to the inner side of the knife are thus removed, and a similar procedure is carried out on the posterior lip. Sutures are then passed as shown in Fig. 481-C, bending the raw surface on itself, so that the two portions are approximated and will grow together. Any raw surfaces left at the sides of the anterior or posterior lips are closed by suturing.

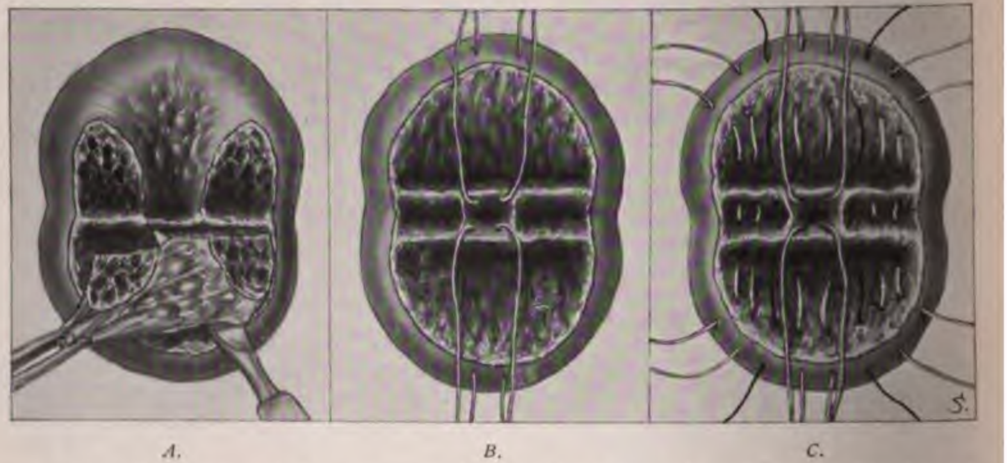


Fig. 481.—Excision of the cystic area of the cervix (Schroeder's method). *A*, The bilateral incision has been made and the cystic area of the lower lip is being excised. *B*, The cystic area of each lip has been removed and the central sutures passed for holding open the canal. *C*, The remaining sutures have been passed and all are ready for tying. The suturing is done with chronic catgut (No. 2, forty-day). It is well to reinforce this with a silkworm gut suture on each side as here indicated.

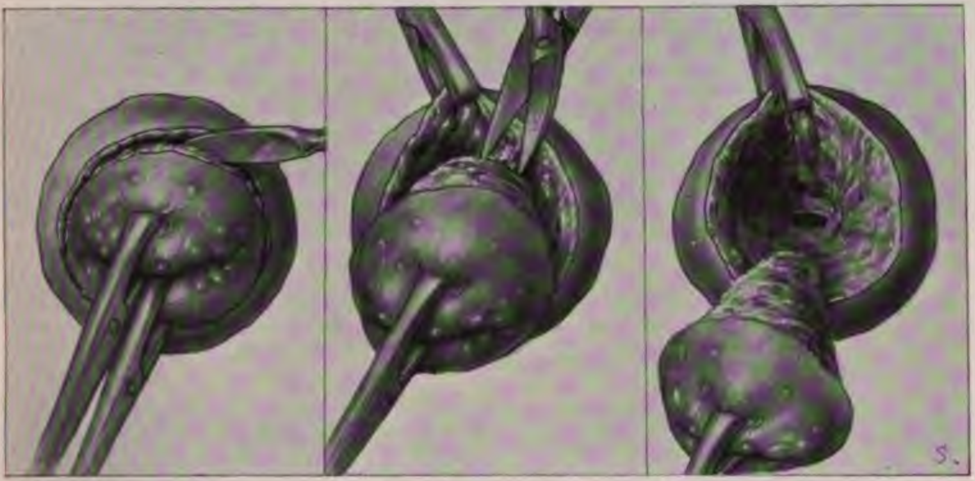
This operation removes most of the diseased tissue and reduces the size and weight of the cervix. At the same time any troublesome scar-tissue in the angles of the laceration may be removed.

Conical Excision

This excellent method of excising the cystic area of the cervix was devised by Sturmdorf (Surg., Gynec. and Obst., January, 1916) who described the steps briefly as follows:

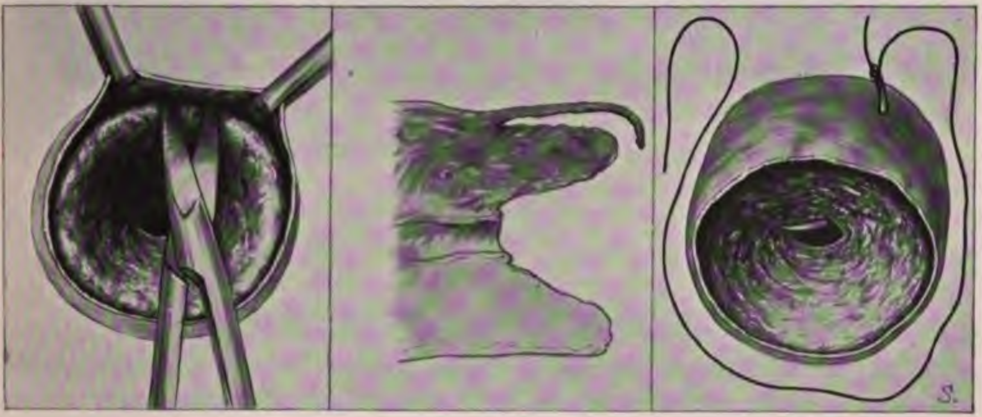
"**1.** Outlining and free mobilization of an ample circular flap from the vaginal coat of the cervix.

"**2.** Complete excision of the entire cervical mucosa to the internal os, with preservation of its peripheral muscular layers.



A. *B.* *C.*

Fig. 482.—Conical excision of cystic area of cervix (Sturmdorf method). *A*, Outlining the cystic area to be removed. No more of cervical tissue should be removed than is really necessary, the excision being limited to the clearly cystic portion. *B*, Excising the deeper portion of the cone of cystic cervical mucosa. *C*, The raw cavity left.

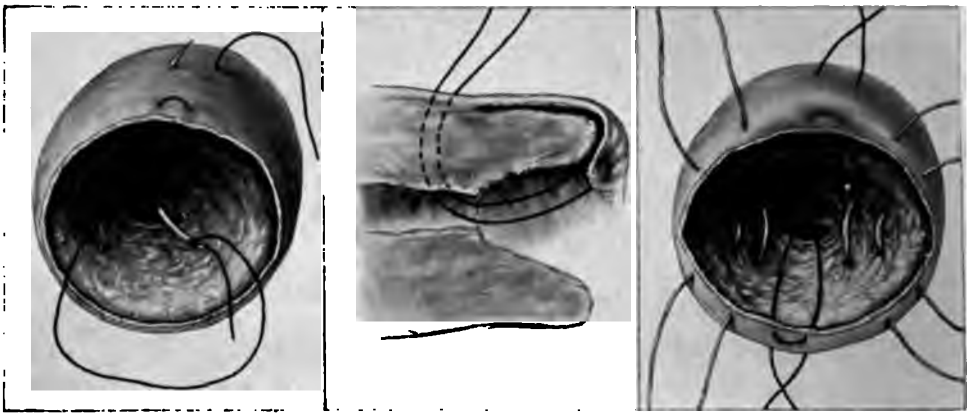


A. *B.* *C.*

Fig. 483.—Conical excision. *A*, Loosening the flaps to cover the raw area. *B*, The upper flap loosened. *C*, First step in passing the special suture for the upper flap.

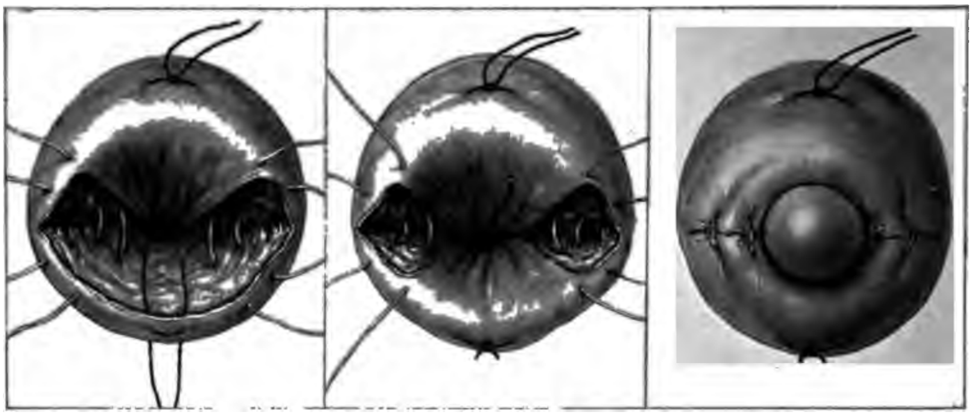
"**3.** Sutural coaptation of the vaginal cuff to the denuded cervical cavity."

The details of the various steps are shown in Figs. 482 to 485. For the main suture above and below, silkworm-gut or kangaroo tendon should be used. For the lateral sutures forty-day chromic catgut is satisfactory.



A. B. C.

Fig. 484.—Conical excision. *A*, The special suture has been passed once through the cervix, twice through the tip of the flap and is being passed back through the cervix. *B*, The special suture in place, ready to be tied after the other sutures are passed. *C*, Both special sutures have been passed and also the lateral hemostatic sutures. The two special sutures should be of silkworm gut or kangaroo tendon and the lateral sutures of chromic catgut.



A. B. C.

Fig. 485.—Conical excision. *A*, The upper flap drawn in by tying the special suture. *B*, Both flaps drawn in. *C*, All sutures tied and the stem in place. All silkworm gut sutures should be cut long to avoid troublesome sticking by the ends.

HYPERTROPHY OF CERVIX

The term "hypertrophy" or "idiopathic hypertrophy" is applied to enlargement of the cervix independent of laceration and the resulting inflammation or of definite tumor formation. As this form of hypertrophy results principally in elongation, it is sometimes spoken of as "elongation of cervix." It is a rare affection.

Etiology, Pathology, Diagnosis

The cause of this marked increase of tissue and elongation of the cervix is not definitely known. In some cases of prolapse of the uterus, the vaginal walls which prolapse at the same time drag on the cervix and elongate it, but not to the extent here contemplated. It may occur in the married or unmarried. It occurs oftenest in nullipara. It is held by some that masturbation is an important etiologic factor, as it is in hypertrophy of the labia minora. In regard to age, it occurs most frequently between the ages of fifteen and thirty-five.

There is an increase of tissue in the cervix but in such a way that the cervix is greatly increased in length without a corresponding increase in width. If the hypertrophy takes place only in the vaginal portion of the cervix, it presents the condition shown in Fig. 486, the long cervix projecting along the vagina or even outside of the vagina a considerable distance. The body of the uterus and the vaginal walls remain in approximately normal position. If the hypertrophy is confined to the supravaginal portion (Fig. 487), the vaginal walls, both anterior and posterior, are pushed downward by the same, as in prolapse. The body of the uterus, however, remains in about the normal position. If the hypertrophy is confined to the intermediate portion, the anterior wall and the base of the bladder will be pushed down as in prolapse, the posterior wall remaining stationary. Retroversion of the uterus and more or less prolapse are usually present also, and are caused by the dragging of the heavy cervix and the vaginal walls.

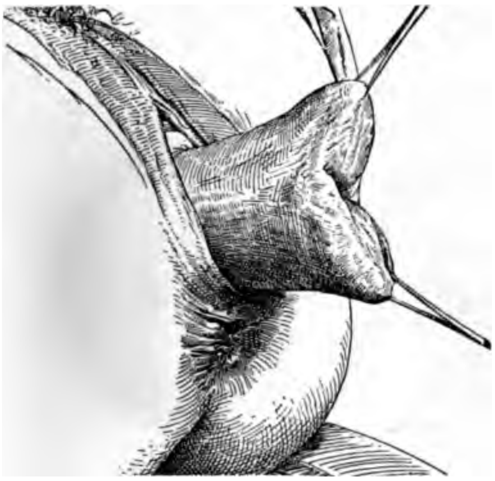


Fig. 486.—Hypertrophy of the infravaginal portion of the cervix. (Kelly—*Operative Gynecology.*)

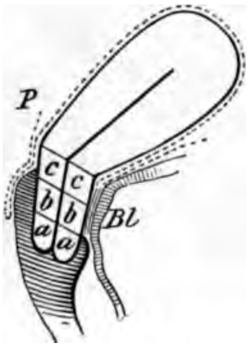


Fig. 487.—The three divisions of the cervix: (*a*) Infravaginal portion. (*b*) Intermediate portion. (*c*) Supravaginal portion. (Byford—*Manual of Gynecology.*)

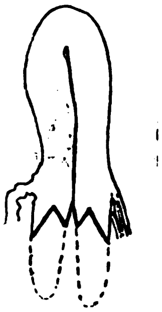


Fig. 488.—Regular amputation of the cervix, showing the wedge-shaped lines of excision. (Skene—*Diseases of Women.*)

The patients complain of dragging weight in the pelvis and of a protrusion at the mouth of the vagina. There may be menstrual disturbance and leucorrhea.

Examination reveals a mass with the characteristics previously mentioned. From PROLAPSUS UTERI it is distinguished by the body of the uterus being in approximately normal position. From UTERINE TUMOR, projecting into the vagina, it is distinguished by its form and by its central cavity. From INVERSION of the uterus, it is distinguished by the body of the uterus being in about the normal position and by its central opening.

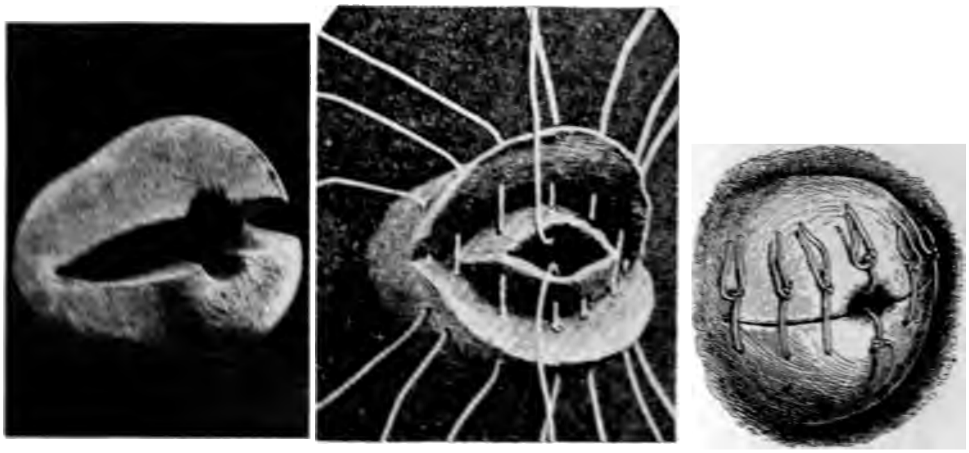
Treatment

The treatment is amputation. The preparations for amputation and the instruments required are the same as for repair of the cervix.

Regular Amputation of Cervix

In this operation enough of the cervix is amputated to reduce it to the normal size. The preferable method is to make the incision in the form of a wedge, as shown in Fig. 488, so that the surfaces will approximate well and unite without excessive scar formation. This is frequently designated as the "wedge-shaped" amputation of the cervix.

The long cervix is first split laterally into an anterior and posterior lip (Fig. 489 A). The required amount of tissue is then removed, as shown in



[illegible] The elongated cervix divided bilat- [illegible] operation completed. (Skene— [illegible]

[illegible] only the redundant [illegible] resulted from a too radical [illegible]

[illegible] and tied Fig. 489 . [illegible]

[illegible] called for. When em- [illegible] redundant portion, leav- [illegible] frequently followed too [illegible] he had to do a [illegible] from the [illegible] herself. The [illegible] of scar-tissue [illegible] operator had evi- [illegible]

CERVICAL POLYPI

Cervical polypi is the term applied to small nonmalignant tumors found in the cervix uteri. They are usually simple adenomata of the cervical mucosa and hence are frequently designated as "mucous polypi." Occasionally, a small fibromyoma of the cervix will become pediculated and project from the cervix, constituting a polypus.

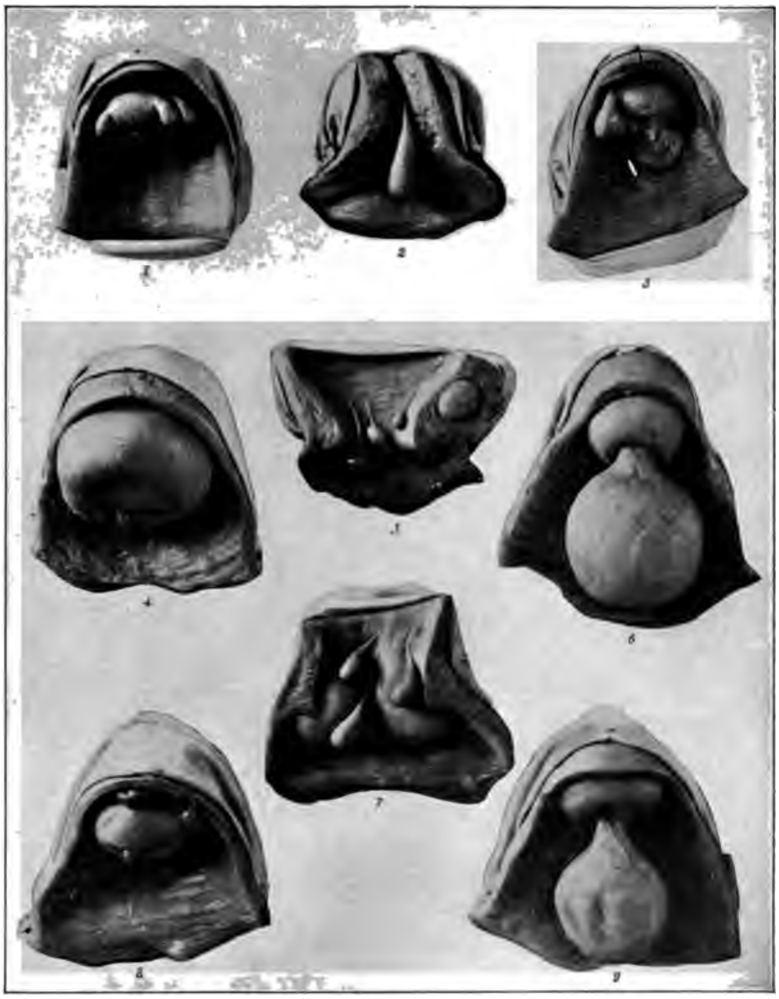


Fig. 490.—Mucous polypi of the cervix. (Hirst—*Diseases of Women.*)

The principal symptoms are bleeding and leucorrheal discharge. It is surprising what troublesome and persistent bleeding will sometimes be occasioned by a small polypus in the cervix.

On digital examination, the small polypus may often be felt as a small soft mass projecting from the cervix or obstructing the external os (Fig. 490). In some cases the polypus is so soft that it is not noticed on palpation.

In the examination through the speculum, the polypus is seen (when low enough in the canal) as a small rounded red mass, projecting from the external os or filling the os.

The important thing in the diagnosis is to distinguish beginning malignant disease from simple polypus. Not infrequently in malignant disease of the cervix small projections form within the cervical canal and appear at the external os, presenting almost the same appearance as the simple polypus. Whenever there is the least doubt as to the nature of the polypus, it should after removal be submitted to microscopic examination. Figs. 491 and 492 show cross sections of cervical polypi of different types.

The treatment is removal. The little mass of tissue may usually be grasped with the long dressing forceps and twisted off. An astringent-antiseptic application is then made, and a tampon or vaginal packing applied.

Fig. [illegible] [illegible] cervical [illegible]

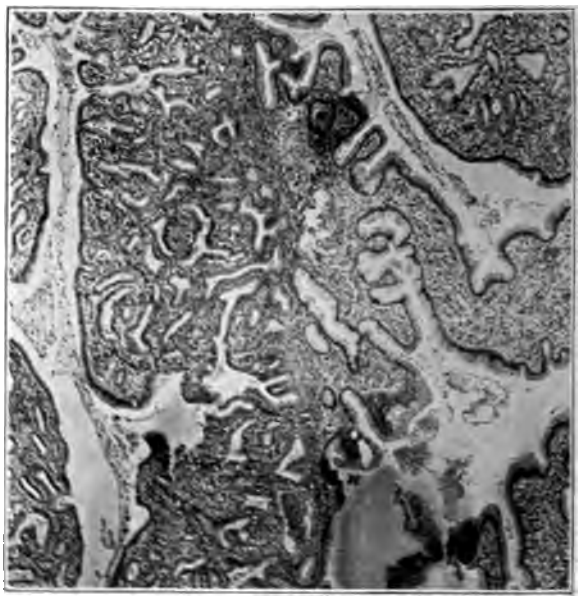


Fig. [illegible] High [illegible] of a cervical polyp of the glandular [illegible] Gyn. Lab.

If there is much bleeding it is well to pack the cervical canal firmly with antiseptic gauze, to be removed in forty-eight hours.

HYPERPLASIA OF ENDOMETRIUM

Hyperplasia of the endometrium (Figs. [illegible]) is a nutritive change and is always chronic. [illegible] sometimes designated as [illegible] endometritis, hypertrophic endometritis, fungous endometritis, polypoid endometritis, [illegible] endometritis, chronic endometritis [illegible]. Some of these terms are used to express particular [illegible] and [illegible] all forms of chronic endometritis [illegible] usage to designate a disease [illegible] as far as practicable, express the distinctive characteristics of that disease. An investigation will demonstrate to the reader that the names here selected out of the mass of names applied to the inflammatory and nutritive disease of the uterus, express clear-cut clinical entities—designated by their distinguishing characteristics and covering the field under consideration without troublesome over-lapping.

The existing confusion between hyperplasia of the endometrium and the so-called endometritis is chiefly due to the fact that heretofore not enough attention has been paid to the important factor of the cyclic change in the histologic picture of the endometrium from one menstruation to the next. With the work of Hitschmann and Adler, confirmed in all its essential features by all the later investigators, the question of endometritis has entered a new stage. A sharper line can be drawn between the changes of the endometrium due to normal ovarian influence, finding their expression in the normal menstrual flow, and changes of a pathologic nature, the result either of abnormal ovarian function or of an infection, usually manifesting themselves in the form of menorrhagia or metrorrhagia. To understand the pathology of the endometrium, it is necessary to have a clear conception of the changes which take place in this membrane incident to the menstrual cycle. These changes have been described in the chapter on the endometrium (see Figs. 430 to 440).

Since the normal changes in the endometrium are due, either directly or indirectly, to stimulation by the ovary or its products, it is readily conceivable that any such stimulation in excess of the normal may bring about pathologic changes. These changes may be merely functional or may be evidenced by histologic changes in structure. This overstimulation, on the other hand, may exist without any demonstrable change in the ovary itself. Furthermore, the change from the normal to the abnormal endometrium is so gradual that it is at times practically impossible to say whether a given endometrium is normal or abnormal.

Etiology

Ovarian hyperfunction may result from any condition which causes either active or passive hyperemia of the ovaries. Active hyperemia is normal in the premenstrual stage. It may be aggravated, possibly, by certain emotional states, especially those of an erotic nature. Any inflammatory process which involves the ovary directly or indirectly, causes active hyperemia which may accelerate the ripening of the follicles and thus shorten the cycle. Passive hyperemia may be due to general conditions such as general asthenia, sedentary habits or uncompensated heart disease, or to local causes such as malpositions of the uterus, prolapse of the ovaries, pressure by tumors and, possibly, adhesions.

Maturation of a graafian follicle causes the normal hyperplasia of the endometrium. After its rupture, the resulting corpus luteum induces hyperemia of the endometrial capillaries with corresponding changes in the stroma and secretion in the hyperplastic glands. For some reason, the mature follicles sometimes fail to rupture but continue to develop and attain an abnormally large size (hydrops folliculi). While the ovum eventually dies, the zona granulosa continues to function, resulting in an abnormal proliferation of the endometrium. This results in true **glandular hyperplasia.**

Pathology

As previously mentioned, there may be all stages and gradations from the normal to the distinctly pathological hyperplasia. To make a diagnosis, it is advantageous to take curettings in the interval, for a degree of hyperplasia which would be perfectly normal in the premenstrual stage would be distinctly pathological in the interval.

In typical hyperplasia, the glands are numerous and vary greatly in size and shape (Figs. 494 and 495). Quite characteristic are the large, dilated glands which appear like retention cysts (Figs. 166, 496). There is, however, no actual retention as the epithelial cells are not flattened out but retain their high columnar shape. Unlike the normal premenstrual mucosa, there is no division into zones or layers, the enlarged glands extending from the muscularis to the surface. The stroma also becomes hyperplastic, in some cases so much so that there are large areas of stroma separating the dilated glands.

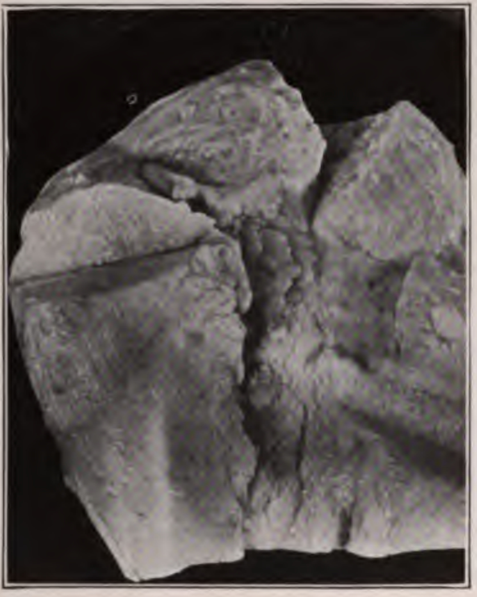


Fig. 493.—Hyperplasia of endometrium. Gross specimen showing greatly thickened endometrium, which is distributed in velvety folds. Gyn. Lab.

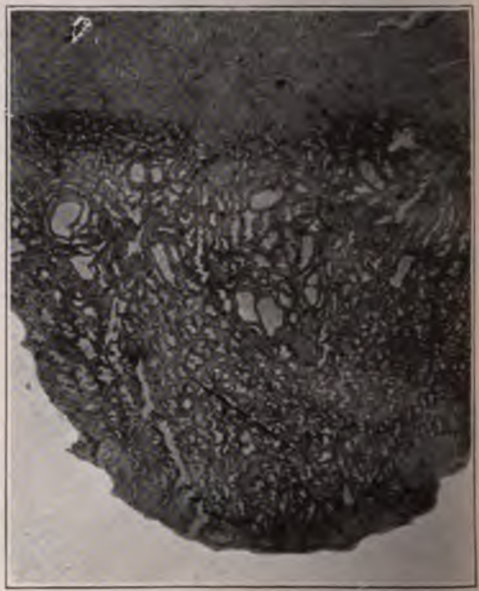


Fig. 494.—Low power picture of the endometrium in Fig. 493. Notice the thick endometrium, the greatly dilated glands and the compact superficial layer. Gyn. Lab.

The stroma is usually dense, the darkly staining cells being closely packed, while in the premenstrual endometrium the cells are swollen and stain more lightly, especially in the compact and spongy layers. There may be some variation, however, the cells in some areas staining more lightly. At any rate, there is no regularity in this regard, the lightly staining areas

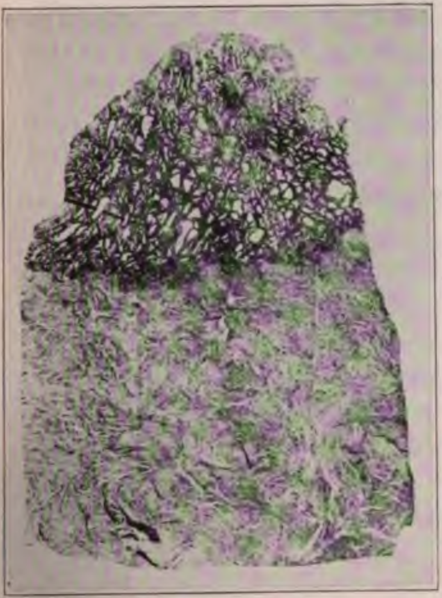


Fig. 495.—Hyperplasia of endometrium. Gyn. Lab.

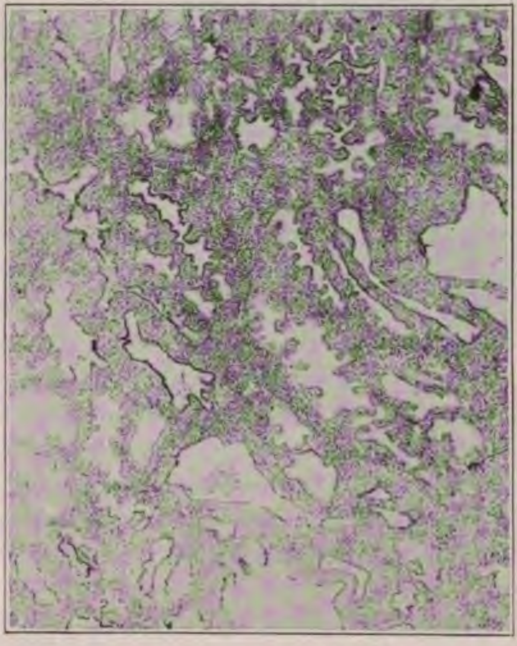


Fig. 496.—Higher power of Fig. 495, showing dilated glands. Gyn. Lab.

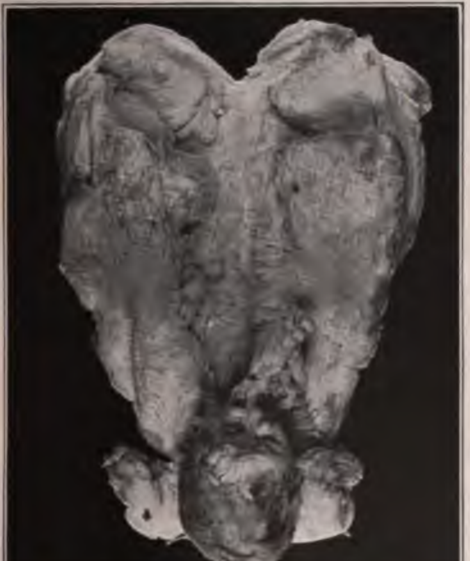


Fig. 497.—Hyperplasia of the endometrium, which has extended to polyp formation. Photograph of gross specimen. Gyn. Lab.

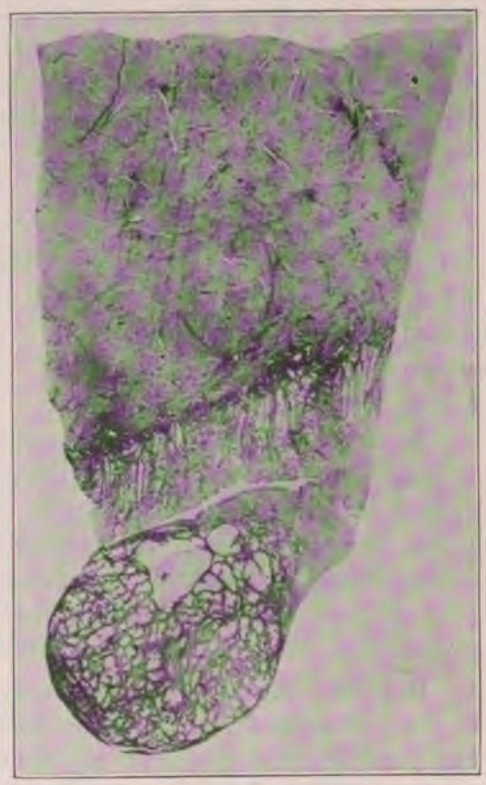


Fig. 498.—Photomicrograph of the specimen shown in Fig. 497. Notice that the polyp is strictly endometrial. Gyn. Lab.

occurring here and there instead of in a definite zone as in the premenstrual endometrium. Since the bleeding in glandular hyperplasia is not caused by a desquamation of the upper layers as in menstruation, but by a localized necrobiosis, we find areas in which there is more or less cell degeneration and interstitial bleeding. The capillaries are always numerous and congested.

In hyperplasia the mucosa may be so redundant as to form folds (Figs. 493, 494) or even polypoid masses (Figs. 497, 498). This has been spoken of as "polypoid endometritis," although it has no connection with inflammation. Discrete polypi, also, may exist without any change in the remaining endometrium. The etiology of these polyps is still in the dark. There is also a more general polypoid condition which occurs at or after the menopause, the etiology of which is not understood.

While round cells, either discrete or in groups, may occur in hyperplasia as in the premenstrual mucosa, they are not necessarily evidence of inflammation. These conditions of hyperplasia have no relation to inflammation and if an endometritis coexists, it is merely incidental.

Symptoms

The one symptom which is common to all these hyperplastic conditions is uterine bleeding. This may manifest itself in a profuse menstrual flow or the bleeding may be irregular or even continuous. In cases due to hyperfunction alone, the menstrual flow is usually regular but more profuse than normal. In aggravated cases it may continue for long periods. In inflammation of the ovaries, the menstrual cycle may be shortened because the active hyperemia may accelerate the ripening of follicles.

It is thought that in typical hyperplasia there is no rupture of the ripe follicles and consequent corpus luteum formation, hence the cycle is completely obliterated and there is no real menstruation, the bleeding being caused by localized necrobiosis and rupture of the engorged capillaries. The bleeding, therefore, occurs without any regularity. The bleeding due to polypi, also, may occur at any time.

In cases of excessive or irregular uterine bleeding the endometrium may be practically normal; in some there is a persistence of the premenstrual type of endometrium throughout the cycle; while, in others, various portions of the endometrium may represent different stages of the cycle. The most marked changes constitute what is known as **glandular hyperplasia.**

Treatment

It is the bleeding that necessitates treatment in these cases. The details of the treatment for this serious disturbance of function will be found in Chapter XIV, for excessive menstruation under "Menorrhagia," and for bleeding between the menses, under "Metrorrhagia." If the bleeding persists in spite of other measures, then **curettage is indicated** (Figs. 502 to 509).

ACUTE ENDOMETRITIS

Acute endometritis is acute inflammation due to bacterial invasion of the endometrium and adjacent tissues in a uterus not recently pregnant. Metritis and endometritis in the recently pregnant uterus (puerperal sepsis) is an obstetric subject.

Etiology and Pathology

Acute endometritis is usually due to infection with the gonococcus as ordinarily this is the only germ that will, on mere contact, implant itself and grow and spread upward, in the nonpuerperal genital tract. Gonorrhea involves the cervix in a large proportion of the cases of vaginal gonorrhea. Its extension upward from the cervix to the endometrium may be spontaneous or induced. Spontaneous extension upward may take place immediately following the infection of the cervical mucosa or the inflammation may remain limited to the cervix for weeks and months, with the possibility of the extension upward at any time. During or immediately following the menstrual flow is the favorite time for the progress upward of the gonococci. This fact can in many cases be clearly shown by questioning the patient closely as to just when the first evidences of endometrial infection appeared. Induced extension of the gonorrheal infection upward may be caused by treatment designed to check the inflammation. On this account, in all local treatment of gonorrheal endocervicitis, great care should be taken to avoid the immediate vicinity of the internal os. Also, sounding of the uterus or other intrauterine instrumentation in cases of gonorrhea of the cervix (acute, chronic or latent), is likely to lead to gonorrheal infection of the endometrium. Infection of the endometrium with other inflammatory bacteria (staphylococcus, streptococcus, colon bacillus, etc.) is usually due to sounding the uterus or other intrauterine instrumentation, the germs being carried in from outside the body or from the vagina or from the cervical canal. Endometritis so caused was rather frequent formerly when the uterine sound was passed by touch but not so now, since the uterus is not so often sounded and when it is sounded care is taken to do the sounding in an aseptic way. Still, in some cases infectious germs lurk in the cervix without decided symptoms, and in spite of precautions the endometrium may be infected.

While extension upward of ordinary pus germs without the intervention of pregnancy or instrumentation is a rare occurrence in the period of functional activity and normal tissue resistance, it occurs more frequently before puberty and after the menopause. Several cases of fatal peritonitis in children from extension upward of streptococci have been reported, and senile endometritis is very likely to be streptococcic or staphylococcic and may result in pyometra.

Practically the whole endometrium is involved. The germs lie on the surface and also penetrate into the glands and into the interglandular tissue. Later, they penetrate into the underlying muscular tissue to a greater or less extent. There are the usual phenomena of inflammation, congestion, swelling, serous and cellular infiltration into the tissues, and a mucopurulent discharge consisting of glandular secretion, serous exudate, dead leucocytes and exfoliated epithelium, with occasionally some blood. There is a marked tendency of the infection to spread to the fallopian tubes.

Symptoms and Diagnosis

In the gonorrheal cases, after the vaginitis or cervicitis has continued a few days or several weeks, as the case may be, the patient complains of "cramps" in the lower abdomen and of soreness in the pelvis when walking, and of increased vaginal discharge. Sometimes the pain is quite severe and occasionally the patient is confined to bed for a few days. There may be moderate fever (101° to 102°), but the fever is rarely marked as in puerperal endometritis. By close questioning, we can usually obtain a history of symptoms indicating gonorrhea within the last few weeks or months.

In the form due to ordinary pus germs, the symptoms are about the same, with a history of some local treatment (intrauterine instrumentation) or of simple endometritis, causing discharge, in which the germs multiply and thus extended upward. If there is any discharge from the urethra or vulvovaginal glands, a spread-preparation of it is made on a cover-glass or slide, which can later be stained and examined for the gonococcus.

Digital and bimanual examination show that the body of the uterus is tender on pressure. If the disease is still-limited to the uterus, there will be no decided tenderness outside the organ. If the trouble has extended to the adnexa, there will be marked tenderness and perhaps a mass about the tube involved. Through the speculum, the mucopurulent discharge may be seen coming from the cervix. Also, the condition of the vaginal walls, as to whether or not they are still inflamed may be thus determined.

The diagnosis of acute endometritis rests upon the following points:

1. Subjective symptoms. Moderate pain and tenderness of recent origin in the lower abdomen, with vaginal discharge and some fever.

2. Tenderness of body of uterus on bimanual examination.

3. Mucopurulent discharge coming from the uterus, as shown by speculum examination.

4. Absence of other evident lesion to account for symptoms. Corroborative of this diagnosis, is a history of recent vaginal inflammation or objective evidence of the same or of inflammation of the urethra or vulvovaginal glands or cervix. The diseases that cause confusion in diagnosis are: acute vaginitis, acute endocervicitis, acute pelvic inflammation and hemorrhage in the pelvis.

In ACUTE VAGINITIS, there is little or no pain or tenderness in the lower abdomen, the uterus is not particularly tender on bimanual examination (the tenderness being in the vaginal walls), and speculum examination shows enough inflammation of vaginal walls to account for the symptoms (soreness and discharge).

In ACUTE ENDOCERVICITIS, there is little or no tenderness in lower abdomen, the body of uterus is not particularly tender on bimanual examination and speculum examination shows a profuse glairy discharge from the cervix.

In ACUTE PELVIC INFLAMMATION, the pain is more constant and sharp and extends more into the sides. Bimanual examination shows that the tenderness is situated about the adnexa of one or both sides, instead of in the body of the uterus. Also, there is usually some indication of a mass of exudate to one side of the uterus.

Of course, any one of the three diseases just mentioned may be found with an acute endometritis and then the symptoms will be intermingled. After having established the fact that the patient has an acute endometritis, the next thing to do is to decide, if practicable, what kind of an endometritis it is—whether gonorrheal or ordinary. If we can find nothing to indicate that the trouble is gonorrheal, we assume that it is caused by the ordinary pus germs. In questioning the patient as to evidence of gonorrhea, it is well in all but exceptional cases to avoid arousing her suspicions that the trouble may be such. Such suspicion on her part will do no good and may do much harm.

The points indicating that the trouble is gonorrheal are:

a. History pointing to recent gonorrhea, particularly symptoms pointing to acute vaginitis and metritis without other cause.

b. Evidences of previous inflammation of urethra (redness and pouting-out of urethral mucous membrane at meatus and tenderness about urethra) or previous inflammation of a vulvovaginal gland (redness about opening, discharge from duct and induration and tenderness of gland).

c. Acute or chronic endocervicitis without cause.

d. Gonococci found in discharge from urethra or vulvovaginal glands or cervix or endometrium.

e. Trouble coming on shortly after marriage without apparent cause.

f. In doubtful cases it is well to send for the husband (without the wife's knowing it) and ascertain from him whether he has any evidence of gonorrhea, new or old.

Treatment

No abortive or quickly curative treatment for gonorrheal or other acute forms of endometritis has been found. There is no probability of immediately dangerous absorption from the uterus (as in puerperal endometritis), but there is great probability of the inflammation becoming chronic and persisting for months or years, and sooner or later involving the tubes. In many cases tubal complications develop in spite of the most careful treatment, though the treatment undoubtedly helps to prevent such complications in other cases. The principal factor in preventing the bacterial invasion is the resisting power of the tissues. The treatment should be of such character as to increase this tissue resistance and at the same time lessen the irritation in and about the infected uterus.

General Measures.—The pelvic congestion and the pain should be relieved as far as possible by general measures. The patient should be put to bed, if she is not there already, and kept in bed until the acute symptoms subside. Open the bowels well by some reliable purgative and then maintain one or two movements daily by a laxative, for example, one or two teaspoonfuls of Rochelle salt each morning in a glass of water one hour before breakfast. Enemata should be avoided in gonorrhea on account of the danger of carrying the infection into the rectum. If there is much pain in the lower abdomen, use hot stupes or the hot-water bag. If this does not give relief, use the ice bag. If the pain is still troublesome or if the patient is restless, give mild sedatives internally.

Vaginal Douches and Applications.—The hot vaginal douche, given according to the special directions in Chapter III, clears the irritating discharge from the vagina and diminishes the pelvic soreness. It should be a weak antiseptic solution, the same as recommended in gonorrheal vaginitis. The length of the interval between douches will depend on the amount of remaining vaginitis and the amount of uterine discharge. Ordinarily, if the vaginal inflammation has about disappeared, every six hours will be often enough for the vaginal douche. If there is still decided vaginitis, the silver nitrate or protargol application and other measures for gonorrheal vaginitis are indicated.

No intrauterine treatment is advisable in acute nonpuerperal endometritis, whether gonorrheal or otherwise. Many kinds of intrauterine treatment have been tried—intrauterine irrigation, intrauterine applications (weak, strong and medium), intrauterine packings (medicated and unmedicated for drainage), caustics and curettage—and all apparently increase rather than diminish the chance of extension upward, which is the great danger. If it is apparent that the uterine cavity is not draining, i.e., that there is retention of pus within, then the cervical canal should be dilated sufficiently and a small rubber tube inserted for drainage. It should be arranged so that it will not slip out, for it is important that the drainage be free and constant. With free drainage and the carrying-out of the other measures mentioned, we have assisted Nature to the full extent of our ability in preventing extension upward to the tube or outward through the uterine wall to the parametrium. Free drainage removes the pus as formed, and, as already explained, the use of any intrauterine instrument whatever is likely to stir up irritation and increase penetration of bacteria and do more harm than it can do good.

CHRONIC ENDOMETRITIS

This is chronic inflammation of the uterus due to bacterial invasion. The different germs have been mentioned when speaking of the various forms of the acute stage of bacterial invasion of the uterus.

Chronic endometritis is not nearly as common as was formerly supposed, in fact it is of comparatively infrequent occurrence. The relative immunity of the endometrium has been ascribed to the fact that it is regularly desquamated at periods, thus tending to cast off any infective agent present. It is usually associated with chronic inflammation of the cervix or tubes, from which sources reinfection frequently takes place. Chronic metritis, to a greater or less degree, usually accompanies chronic endometritis.

Etiology and Pathology

Chronic infected endometritis follows acute infected endometritis (either gonorrheal or septic). In some of the cases of acute inflammation of the uterus, the process does not disappear after the acute symptoms subside but remains for months and years, causing troublesome leucorrhea and menstrual disturbances.

In the uterine tissues the serous infiltration of the acute inflammation is largely absorbed, but the cellular infiltration remains to a considerable extent (Figs. 499, 500) and there is later connective tissue formation. The germs keep up a constant irritation in the tissues, leading to chronic hyperemia of the endometrium and adjacent tissues.

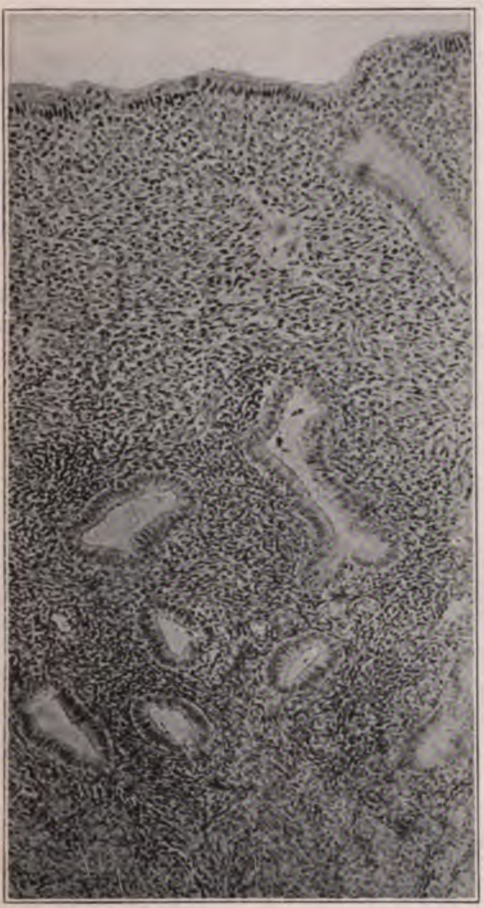


Fig. 499.—Chronic endometritis. Notice the foci of round-cell infiltration. The glands are practically normal—none of the dilatation and bizarre shapes seen in hyperplasia. Gyn. Lab.

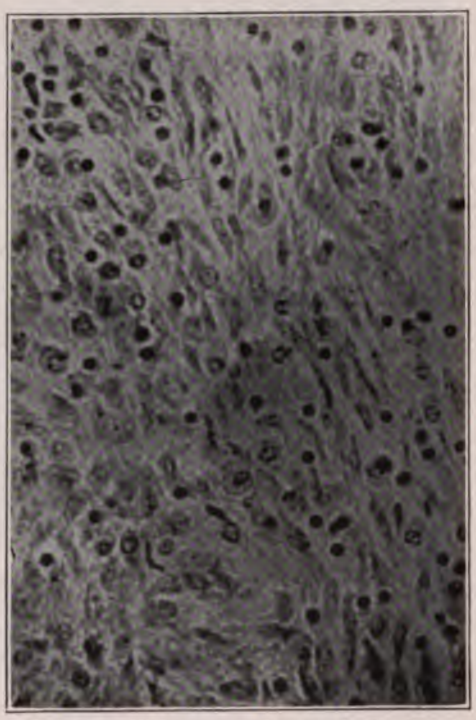
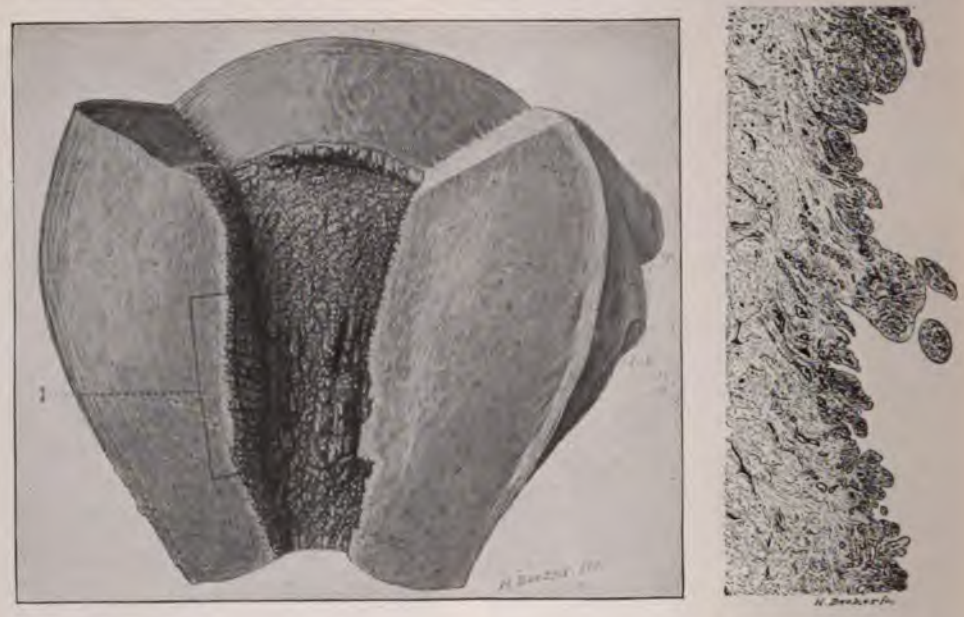


Fig. 500.—High power of one of the foci in Fig. 499. The infiltration is composed chiefly of small round cells and plasma cells. The plasma cells are seen as rather large cells with a more or less fragmented nucleus eccentrically placed. The characteristic details of plasma cells are better shown in Fig. 750. Gyn. Lab.

The diagnosis of chronic endometritis is not always easy, even by microscopic methods. There is often not much change in structure and the diagnosis rests upon the finding of infiltration of the stroma by lymphocytes and, at times, leucocytes, but more especially of plasma cells. Since there is normally a considerable infiltration of the premenstrual endometrium by round cells, the differentiation is often very difficult. In fact, the specimen should be taken in the period of the interval. The so-called endometrial lymph nodes, which are analogous to those found in the intestinal mucosa and occur normally in the deeper layers, must not be mistaken for localized infection. The glands appear not to be affected by chronic inflammation (Fig. 499).

The menstrual cycle is supposed to remain unchanged as long as the ovaries are not affected. However, the congestion and persistent irritation of the uterine mucosa with the resulting congestion of the ovaries are very likely to give rise to hyperplasia and a hemorrhagic tendency. The hypertrophy or hyperplasia may progress to such an extent that the mucosa becomes many times its usual thickness. When the hyperplasia is so marked, it usually takes place unevenly, so that the surface is rough and nodular, giving rise to the name "fungous" endometritis. Chronic endometritis of the fungous form is shown in Fig. 501. In this condition the hemorrhagic tendency is a marked feature, hence the name "hemorrhagic" endometritis. In some cases the masses project out from the surface and become pediculated and give rise to polypi. This condition is known also as "polypoid" endometritis. The gland ducts become obstructed and retention cysts are thus formed. In some cases of the fungous and polypoid form of



A. *B.*

Fig. 501.—Chronic endometritis and hyperplasia. *A*, Gross specimen, showing the papillary fungus condition of the endometrium, sometimes referred to as "fungus endometritis" or "polypoid endometritis." *B*, Microscopic section, showing the polypoid character of the endometrium. (Cullen—*Cancer of the Uterus.*)

endometritis, the interstitial tissue in the endometrium undergoes decided increase and hence the condition is sometimes designated interstitial endometritis. After a long time the cellular infiltration largely disappears, new connective tissue taking its place, and this connective tissue contracts. The glands are thus injuriously pressed upon and begin to undergo pressure-atrophy, their ducts are obstructed and cystic dilatation takes place. This process becomes more and more marked until there is great destruction of gland tissue and the condition passes into "sclerosis" of the uterus, in which little remains of the mucosa but scar-tissue. The change from ordinary chronic endometritis to the condition of sclerosis takes several years, except in those cases in which the process is hastened by the use of destructive applications within the uterus.

Rarely, in long continued inflammation of the endometrium, the columnar epithelium lining the surface undergoes metaplasia and is converted into stratified squamous epithelium. This usually occurs in spots and is known as psoriasis uteri. It is probably the basis for the squamous carcinoma which occurs very rarely in the body of the uterus.

Symptoms

The patient comes complaining of a vaginal discharge (leucorrhea) which she has had for several months or years, as the case may be. This may be free or very slight, and may be the only symptom. Usually, however, there are menstrual disturbances—painful menstruation, increased menstrual flow and at times irregular menstruation. When hypertrophy of the endometrium is a marked feature of the endometritis, the hemorrhagic tendency is likewise marked. The menses may last a week or ten days, and bleeding between times may appear. Hemorrhage is especially marked in the fungous or polypoid condition of the endometrium. A polypus thus formed, may give rise to sudden serious uterine hemorrhage. Occasionally the menstrual flow is diminished, but usually not unless atrophic changes are present.

Backache and weight in the pelvis and dragging pains very frequently accompany endometritis. The patient tires easily and cannot do the work or the walking that she formerly could. All these symptoms are, as a rule, much worse than during the menstrual period. Sterility is usually present if the endometrial changes are marked. Bacteria may be carried from the infected endometrium as a focus to distant joints and other tissues, causing inflammation there.

There are often, also, more severe symptoms due to some associated affection, such as salpingitis or malposition of the uterus. By questioning the patient it can usually be determined whether the acute infection was gonorrheal or ordinary septic inflammation. The questioning should always be conducted, of course, in such a way as not to arouse the patient's suspicion of disease in her husband. If the process has continued long, the uterus is generally increased in size, particularly so when the infection followed labor or abortion, with resulting subinvolution. In the examination, search should, of course, be made for tubal complications and other associated diseases. If salpingitis is present, it shows that infection has extended to the endometrium and thence to the tube.

On speculum examination, it is seen that the discharge comes from the uterus, for it is found about the external os and in the cervical canal. The amount of discharge coming from the uterus may be determined, if desired, by placing a tampon against the cervix and removing it after twelve to twenty-four hours. In chronic endometritis the discharge may be slight or free, and is mixed with cervical mucus. There is more discharge than can be accounted for by the cervical lesions present.

The diseases which are most likely to be confused with chronic endometritis are as follows:

Endocervicitis.—In endocervicitis, the cervix presents evidence of inflammation enough to account for the discharge, and there is no enlargement or tenderness of the uterus or evidence of tubal inflammation.

In **Hyperplasia of the Endometrium** there is no infection of the uterus and no tubal infection of intrauterine origin. So-called "endometritis" in a virgin is almost always endometrial hyperplasia.

Subinvolution without infection, presents a large uterus with discharge and menstrual disturbance, but without any history of infection.

Tuberculosis of uterus. In this there are usually evidences of tuberculous disease of the tubes and pelvic peritoneum. It resists the treatment for endometritis, and tubercle bacilli are found in the discharge or characteristic microscopic evidence is found in tissues removed by curettage.

Malignant disease of the endometrium. In malignant disease, the apparent endometritis does not yield to regular treatment, and when the uterus is cleared out with a curet and the scrapings examined microscopically, malignant infiltration is found.

Treatment

1. **General Measures.**—The patient should rest in bed as much as possible during the menstrual periods and also during any acute exacerbation of the trouble. Use purgatives and laxatives sufficiently to keep the bowels well open. Ergotin and hydrastis have some effect on the uterus and are indicated in hemorrhagic conditions. For the relief of pain at the menstrual period or at other times, the sedative measures mentioned under Dysmenorrhea are employed. Sitz-baths taken just before retiring often give much relief to those patients complaining of pain in the back and sacrum and pelvis and down the thighs, worse at the close of the day.

Look for any extragenital disease requiring attention. Put the patient in the best possible general health. Correct any dyscrasia present. Poor blood from general diathetic disease often tends to keep up chronic inflammation in any situation.

2. **Hot Vaginal Douches** should be given one to three times daily, depending on the amount of discharge and the amount of pain. The necessary details are described in Chapter III.

3. **Curettage.**—In long-continued chronic inflammation of the uterus there

may be considerable hyperplasia, giving thickened tissue which should be removed. Curettage removes the bulk of the diseased mucosa, allowing a new and presumably a better one to develop.

Curettage

FOR CHRONIC ENDOMETRITIS, HYPERPLASIA OF ENDOMETRIUM, AND INTRAUTERINE DIAGNOSIS

The **preparations** for curettage are the same as for repair of the pelvic floor. The instruments required are shown in Fig. 502. If it is desired to cleanse the uterine cavity by irrigation, instead of swabbing, add an intra-uterine irrigating tube. If a piece of the cervix is to be excised for microscopic examination, add a long sharp-pointed scissors, two strong cervix needles, a needle-holder and suture material.

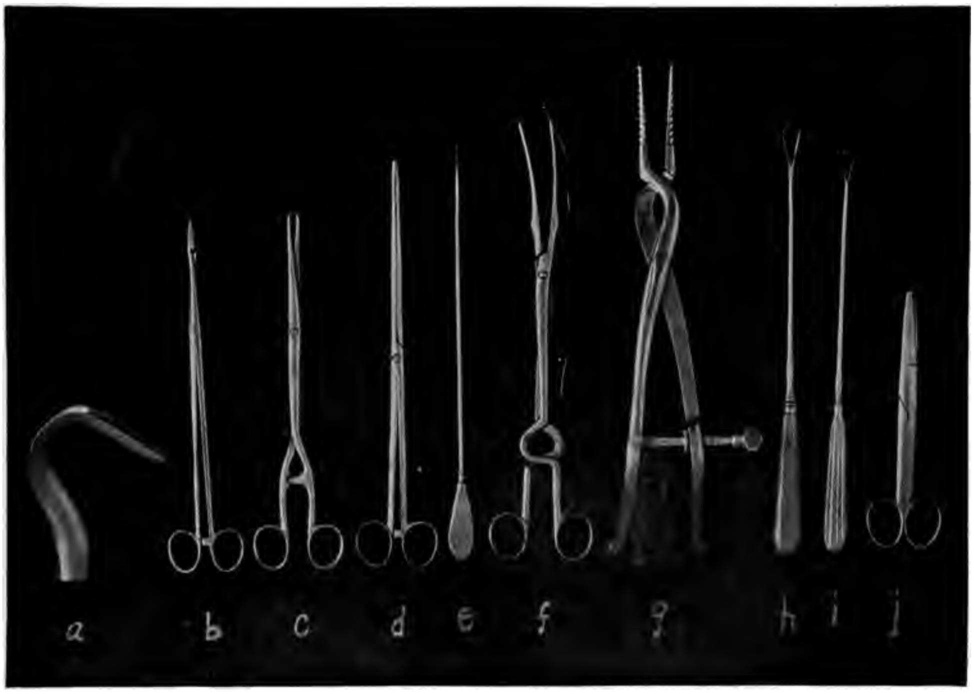


Fig. 502.—Instruments for curettage; *a*, Edebohl's self-retaining speculum; *b*, vaginal dressing-forceps, for cleansing vagina; *c*, long tenaculum-forceps, for holding cervix; *d*, uterine dressing-forceps, for swabbing within vagina; *e*, uterine sound (the bulbous end does not show distinctly in the photograph); *f*, small uterine dilator; *g*, large uterine dilator (Wathen's); *h*, sharp uterine curet with flexible shank, large size; *i*, sharp uterine curet, small size; *j*, short scissors for cutting gauze. If a piece from the cervix is to be excised for microscopic examination, add a long sharp-pointed scissors and suture material and needles and a needle-holder.

Steps in the Operation. 1. The patient is anesthetized and placed in the dorsal posture, with the feet in the upright supports and the hips at the edge of the table (Fig. 503). The external genitals and adjacent surfaces are thoroughly scrubbed (having been shaved in the preparation before anesthesia) with boiled water and some liquid preparation of green soap, using pieces of absorbent cotton. Then the vagina is vigorously cleansed with the soap solution, using cotton-balls held in long forceps and introducing two fingers or a retractor into the vagina to spread out the walls and smooth out the depressions so as to permit thorough cleansing of the walls. Then cleanse the vagina and external genitals thoroughly with bichloride solution or, if preferred, with 5 per cent solution of picric acid in alcohol.

2. Introduce the retractor, catch the cervix with the tenaculum forceps and carefully introduce the uterine sound to determine the direction and depth of the canal. Then dilate the canal some with the dressing forceps or small dilator.

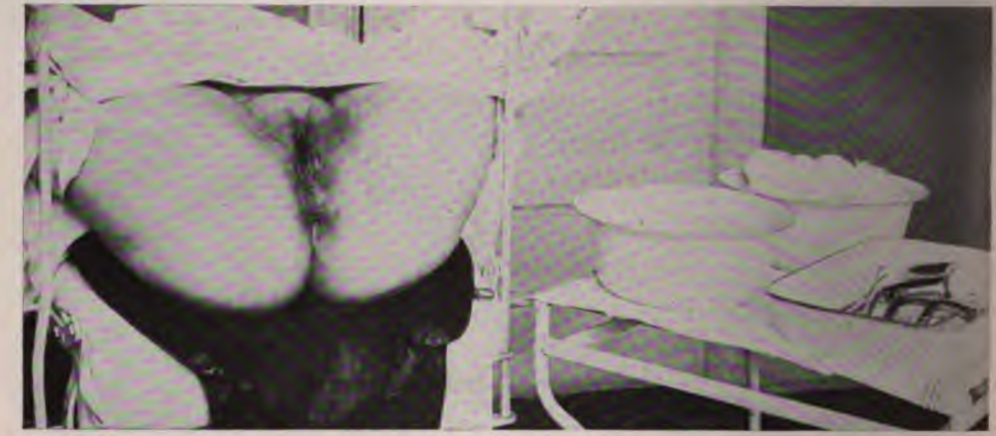


Fig. 503.—The patient in position at the end of the table. After the patient is anesthetized, the feet are fastened in the leg-supports and the hips are brought over the end of the table.

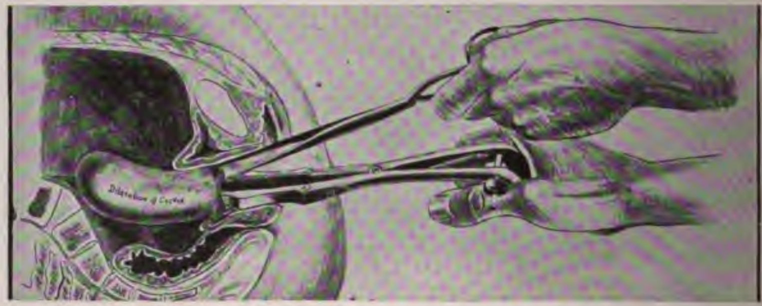


Fig. 504.—The large dilator in place. (Gilliam—*Practical Gynecology*.)

The canal is now open so that the uterine cavity may be cleansed with the antiseptic solution, using cotton held in the uterine forceps. Then the large dilator is introduced and the cervix is thoroughly dilated (Figs. 504, 505). The dilatation should be carried out slowly and carefully, the direction of the dilatation being changed several times, to secure gradual dilatation in all directions and prevent rupture of cervix. The cervix should, in this manner, be dilated sufficiently to admit the large curet easily.

In certain cases in which the cervix is abnormal, it may suddenly tear at some point and the blade of the dilator will pass through the wall of the cervix into the periuterine connective tissue. To prevent this accident it is well to keep the set-screw at the handle between the blades, set so that there can be no sudden wide separation of the dilating portion of the blades. A dilatation of ¾ in. to 1¼ in. should be secured.

3. Cleanse the cavity again and introduce the large curet (Figs. 506, 507) and clear out the softened endometrium. The curet should be held tightly between the thumb and the fingers, in the same manner as a pen (Fig. 507). A mark on the handle indicates in which direction the cutting edge lies. The interior of the uterus should be gone over systematically, so that no part of the surface is missed. The pressure must be applied carefully. It must be

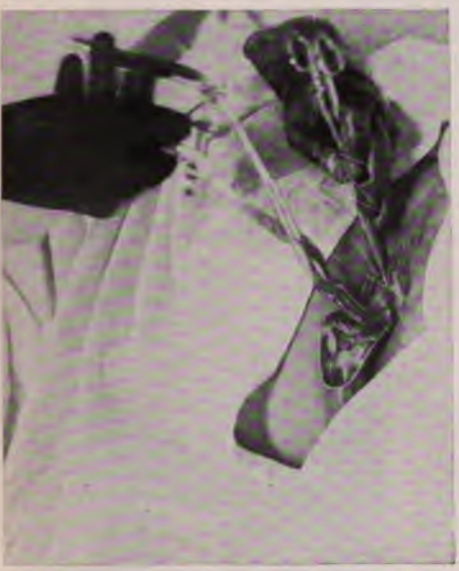


Fig. 505.—Introducing the large dilator.

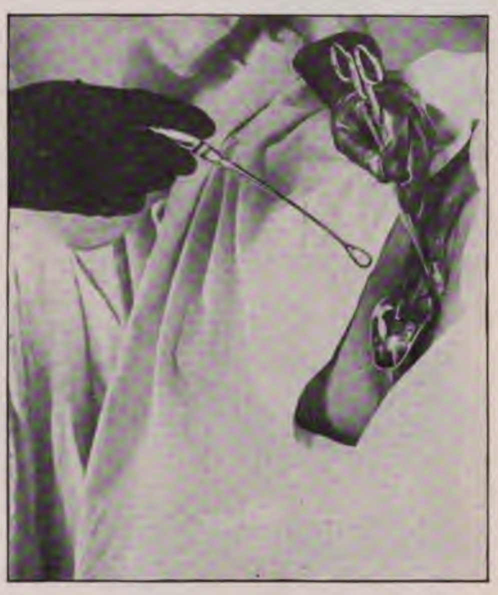


Fig. 506.—Introducing the curet. This shows the form of the curet and also the manner of steadying the cervix with a tenaculum forceps.

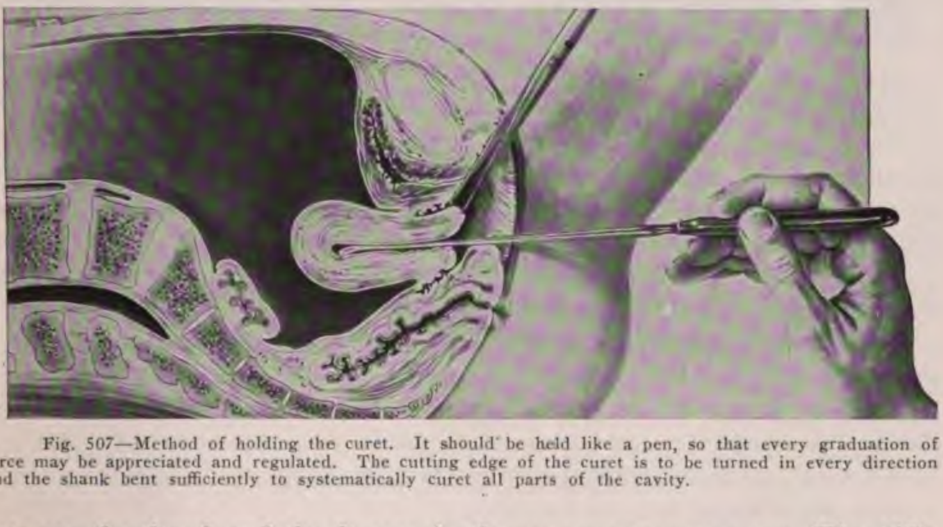


Fig. 507—Method of holding the curet. It should be held like a pen, so that every graduation of force may be appreciated and regulated. The cutting edge of the curet is to be turned in every direction and the shank bent sufficiently to systematically curet all parts of the cavity.

firm enough to remove the softened disease tissue, but not firm enough to remove any of the firm tissue beneath it. The fact that comparatively healthy firm tissue has been reached is indicated by the grating sensation imparted to the curet. As a rule this is easily recognized, and after some practice the uterus may be cleared out rapidly and safely. In exceptional cases, however, the wall of the uterus is diseased to a considerable extent and softened, and great care is necessary to avoid perforation of the wall.

If the apparent inflammation has been of long standing, the scrapings should be saved and submitted to microscopic examination, that malignant disease or tuberculosis may be discovered, if present.

After the surface has been systematically gone over with the sharp curet, the debris is removed by swabbing with cotton in a forceps, and the cavity is again disinfected with the picric solution or other antiseptic. If there is much bleeding, it is well to make an application of carbolic acid followed by one of alcohol. This cauterizing application is desirable also in cases of suspected malignancy in order to kill loose cancer cells and seal lymph spaces and prevent metastases of cancer cells.

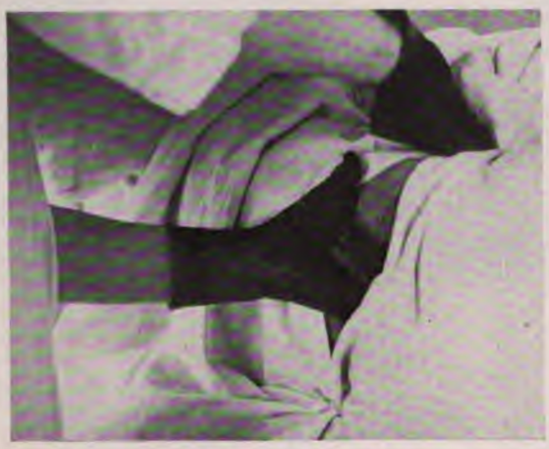


Fig. 508.—Returning the uterus to its normal position after curettage, and making the bimanual examination under anesthesia. The examination under anesthesia may be made immediately before the curettage if preferred.

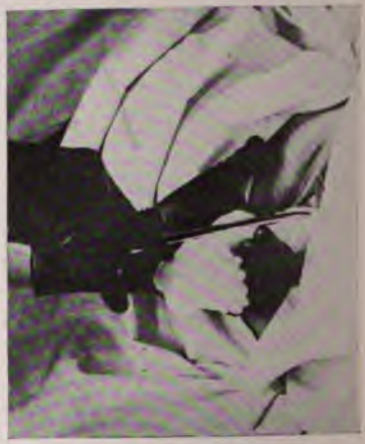


Fig. 509.—Putting in the vaginal packing.

4. If there is persistent bleeding, the uterine cavity may be packed with gauze, otherwise a packing is hardly needed.

5. Cleanse the vagina, introduce two fingers in the vagina, remove the speculum and bring the fundus uteri well forward by bimanual manipulation (Fig. 508). In the curettage, the uterus is drawn downward somewhat and the fundus sometimes goes backward. Unless the uterus is brought forward into normal position at the close of the operation, it is likely to remain in retrodisplacement and cause trouble.

If it is desired to have the vaginal and intrauterine packing all in one piece, so that it can be more easily removed later, the vaginal portion may be held in the palm of the hand (Fig. 509) during the replacement of the uterus.

At the same time that the fundus uteri is being brought forward (or before beginning the curettage, if thought preferable) a **pelvic examination** under anesthesia may be made. In many of these cases of chronic endometritis, there are tubal or ovarian complications, the nature and extent of which are best made out by examination under anesthesia. Again, a frequent complication of chronic endometritis is adherent retroversion, and it is important to determine exactly the environment of the uterus—whether it can be brought forward without danger, how firm and extensive the adhesions are and whether there is any collection of pus in the mass of adhesions or in the tubes.

After curettage the epithelial covering of the uterine interior is quickly regenerated from the epithelium of the remnants of glands remaining, and gradually the whole endometrium is restored.

After-care.—The antiseptic care of a patient after curettage is practically the same as after repair of cervix.

The vaginal and uterine packing is removed in about forty-eight hours, and an antiseptic vaginal douche is given once daily. The vulvar dressing is continued for ten days. The patient may ordinarily get up in three or four days after curettage, except when there is some associated disease that would be benefited by longer rest in bed—for example, in chronic salpingitis associated with chronic endometritis, the patient may be kept in bed ten days to two weeks with decided benefit.

Curettage is only one step in the treatment of chronic endometritis. After that the other measures mentioned should be carried out as before. Associated pathologic conditions, such as malposition of uterus, laceration of cervix, laceration of pelvic floor and pelvic inflammation, must also be corrected as far as possible, for if allowed to continue, the uterine congestion resulting therefrom will tend to prolong the endometritis and will result in the reformation of a thickened bleeding endometrium.

Attention must be called to the dangers of curettage, which is not the simple and harmless procedure many suppose. The uterine wall is easily perforated by the curet or sound or forceps, which perforation may cause fatal peritonitis. Curettage may cause serious aggravation of conditions in cases of pelvic inflammation or of tubal pregnancy. In other words, uterine curettage carries the dangers incident to a surgical procedure within a vulnerable organ situated in the peritoneal cavity, and it must be used with due skill and for proper indications only. Indiscriminate curetting of the uterus has done much harm through lack of skill in technic and lack of judgment in the choice of cases.

SUBINVOLUTION OF UTERUS

Subinvolution is the term applied to that condition of the uterus found in cases in which, after labor or abortion, it fails to return to its normal size. It remains large and heavy, and its walls are greatly thickened (Figs. 510, 511).

Etiology

Subinvolution is due to some interference with the retrograde changes that normally follow labor. These retrograde changes that normally take place, consist of atrophy of the muscular and connective tissue. Fatty degeneration, which was formerly supposed to occupy such a prominent place in the process, has been found to be a subordinate feature. The retrograde changes may be interfered with by anything that prevents proper contraction and retraction of the uterus or that causes chronic congestion.

A uterus which becomes infected after labor does not return to its normal size unless the infection is overcome. Retained membranes or placental remnants also interfere with the process of involution, even without infection. General diseases, producing an impoverished condition of the blood may, following labor, so interfere with the nutrition of the uterus as to cause subinvolution. Retrodisplacement of the uterus after labor or abortion, is another cause of subinvolution.

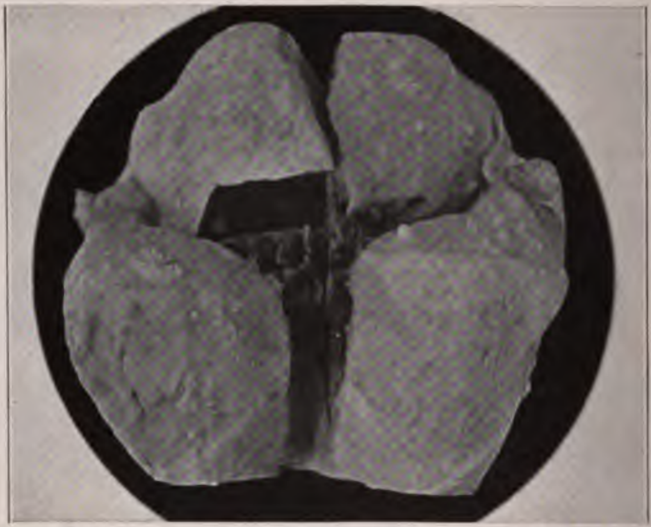


Fig. 510.—Subinvolution of the uterus. Gross specimen, showing marked thickening of the uterine wall and numerous large thickened projecting vessels. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

Pathology

Subinvolution is, at best, a relative term, for every parous uterus shows some evidence of "subinvolution." There is never a complete restitution to the virginal uterus. With succeeding pregnancies there is an increasing amount of connective tissue deposited while the blood vessels seldom regress to their former condition.

In typical subinvolution the uterus is enlarged to a varying degree. On section the musculature appears coarse and the blood vessels stand out above the surface (Fig. 510). Microscopically there may be a preponderance of connective tissue and there is usually some lack of uniformity, the involution being more advanced in some parts than in others. The endometrium may or may not be thickened.

The most characteristic changes are seen in the blood vessels. In normal involution the enlarged vessels are partially or completely obliterated by an increase in the elastic tissue fibers of the intima and media. This tissue then becomes hyaline and is absorbed. In subinvolution the process may be

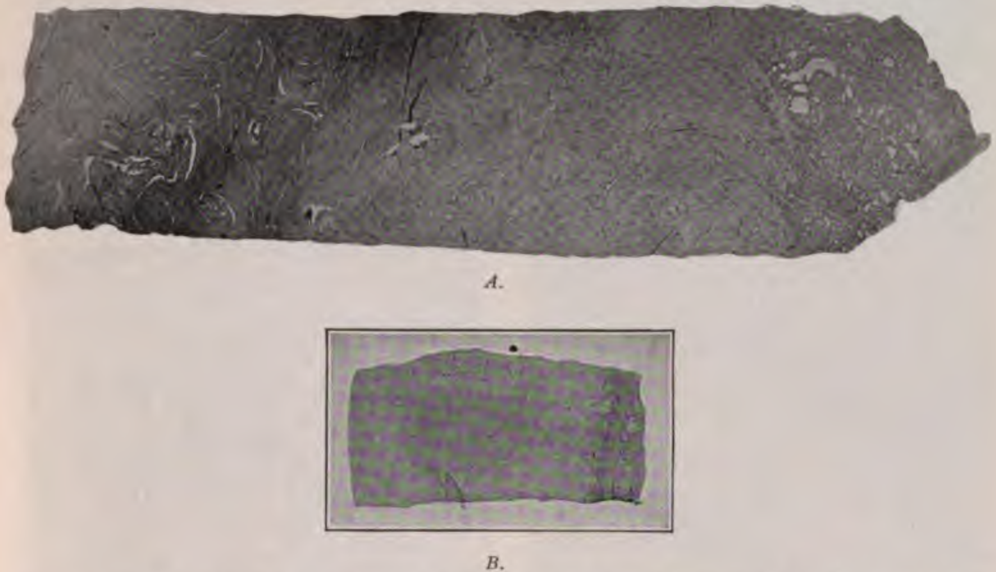


Fig. 511.—Uterine wall from a case of chronic subinvolution (*A*) contrasted in thickness with a normal wall (*B*), both being magnified to the same extent. In this case of subinvolution the uterine wall was 40 mm. thick (myometrium 31 mm., endometrium 9 mm.). The thickness of the wall is due chiefly to subinvolution-abnormalities of vessels and muscle and connective tissue. Gyn. Lab.

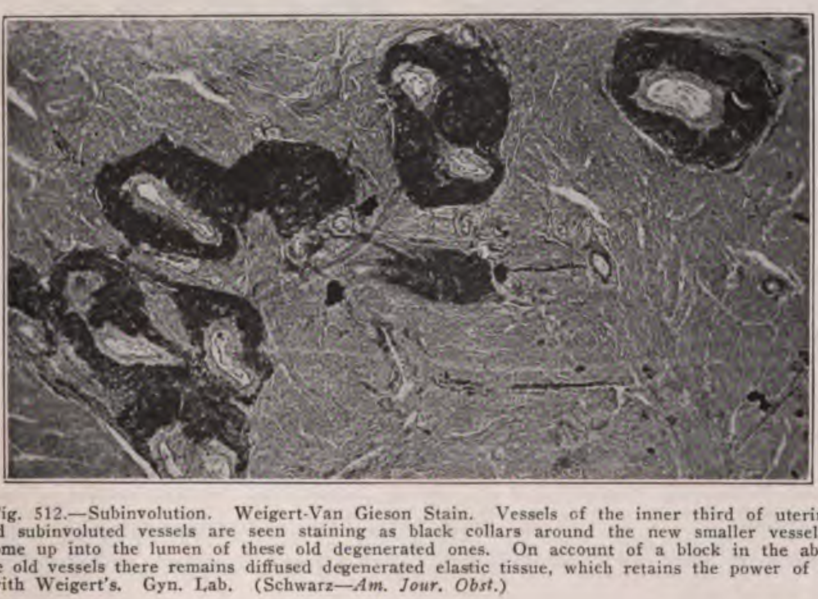


Fig. 512.—Subinvolution. Weigert-Van Gieson Stain. Vessels of the inner third of uterine wall. The old subinvoluted vessels are seen staining as black collars around the new smaller vessels which have come up into the lumen of these old degenerated ones. On account of a block in the absorption of these old vessels there remains diffused degenerated elastic tissue, which retains the power of staining black with Weigert's. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

halted at any stage, giving rise to vessels with immensely thickened walls and often very irregular shapes. The great thickening in the vessels is due largely to the remaining unabsorbed elastic tissue. This old unabsorbed elastic tissue undergoes a peculiar degeneration and diffusion, so that large areas of degenerated elastic material are found about the vessels (Figs. 512, 513). Elsewhere, also, there remain areas of diffused, unabsorbed elastic material (Fig. 514). Much work has been done on this interesting problem by Pankow, Goodall, Shaw, and others. The subject is reviewed and a study of a series of over seventy uteri presented in an excellent article by Schwarz (Am. Jour. Obst., January, 1919).

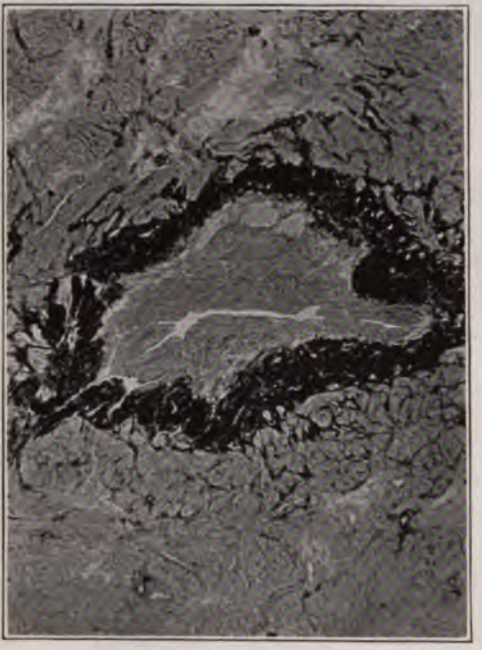


Fig. 513.—Subinvolution. Weigert-Van Gieson Stain. Vein of middle third of uterine wall. The black staining shows that the unabsorbed degenerated elastic tissue has diffused through most of the vessel wall, a condition characteristic of subinvolution. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

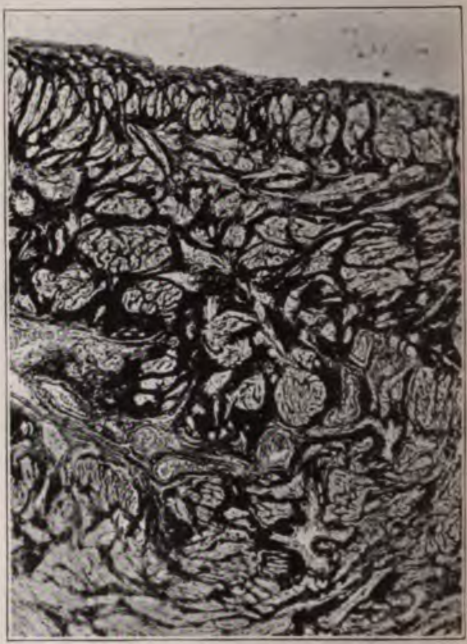


Fig. 514.—Subinvolution. Weigert-Van Gieson Stain. Outer third of uterine wall, showing the amount of diffuse dead elastic tissue between the muscle bundles, due to lack of absorption of this degenerated material during the process of involution. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

Symptoms and Diagnosis

The symptoms of subinvolution are simply a sense of weight and pressure and weakness in the pelvis, with menstrual disturbances (usually increased flow). As a rule the most prominent symptoms are those due to complications, such as hyperplastic endometrium, infected endometritis or retrodisplacement.

In practically all cases of infection following labor or abortion, there is subinvolution, but as the endometrial involvement is the more important lesion, these cases usually are classed as endometritis. The term subinvolution is left for those cases in which the enlargement and softening of the uterus is the principal lesion.

The enlarged uterus is found low in the pelvis and not particularly tender, unless there is a complicating endometritis. The uterus may be retroverted and there is often laceration of the pelvic floor. The history connects the trouble with a previous labor or miscarriage.

Treatment

The principal disturbances accompanying subinvolution come from the associated diseases, consequently the treatment is directed largely to the associated conditions. The following measures tend to tone up and improve the condition of the uterine wall and tend also to benefit the accompanying endometritis.

1. Give general tonics as indicated by the patient's general condition, and uterine astringents (ergotin, hydrastis, stypticin) to tone up the uterine wall. Also, give laxatives as indicated by the condition of the intestinal tract.

2. Give hot vaginal douches (antiseptic and astringent), for example, the lysol douche or the alum and zinc sulphate douche. Also employ linear cauterization of the cervix or ichthyol-glycerin tampons or vaginal suppositories when indicated.

3. Curettage is the most effective measure for checking the endometritis and reducing the size of the uterus. Curettage should be followed by the other remedial measures, such as hot douches, laxatives, uterine astringents internally and other measures mentioned.

4. Repair of cervix and restoration of pelvic floor may be indicated. Where the cervix has been severely torn or there is severe laceration of the pelvic floor, these lesions must, of course, be repaired.

5. Excision of cervix. If the cervix is much elongated, the regular wedge-shaped amputation may be carried out (Figs. 488, 489). If the cervix is not large enough to necessitate that and yet is enlarged and heavy, excision of the cystic area may be carried out (Figs. 479 to 485).

Prophylaxis of Subinvolution

Subinvolution is one of those diseases which may in a measure be anticipated and often prevented. The measures to be employed in the puerperium to avoid subinvolution are as follows:

1. Prevent infection following labor or abortion by careful attention to asepsis.

2. See that the uterus is emptied of placental remnants and membranes.

3. Repair all lacerations of the pelvic floor.

4. Keep the uterus well contracted. If it shows a tendency to remain relaxed during the puerperium, give strychnine or ergotin or both. Hydrastis tends to tone up the uterus and keep it contracted. Also, keep the bowels open well, to relieve pelvic congestion, and maintain the patient in good general condition by attention to the general health.

5. Prevent retroversion by keeping the patient on the side most of the time after the first few days and not much on the back. When the patient begins to be out of bed, start her on the knee-chest posture (Figs. 229 to 231), to bring the uterus well forward, and the "raising" exercise (Fig. 232) to restore tone to the overstretched abdominal wall. Before discharging the patient, make an examination and determine certainly that there is no displacement.

6. If there is a generally relaxed condition of the tissues (uterus, vaginal walls, etc.), give a hot vaginal douche twice daily after the first week or ten days. If the tissues still remain relaxed, then change to the astringent douche of alum and zinc sulphate.

HYPERTROPHY OF MYOMETRIUM

This condition consists of a uniform hyperplasia of the myometrium. The muscle fibers as well as the fibrous tissue takes part in the hyperplasia.

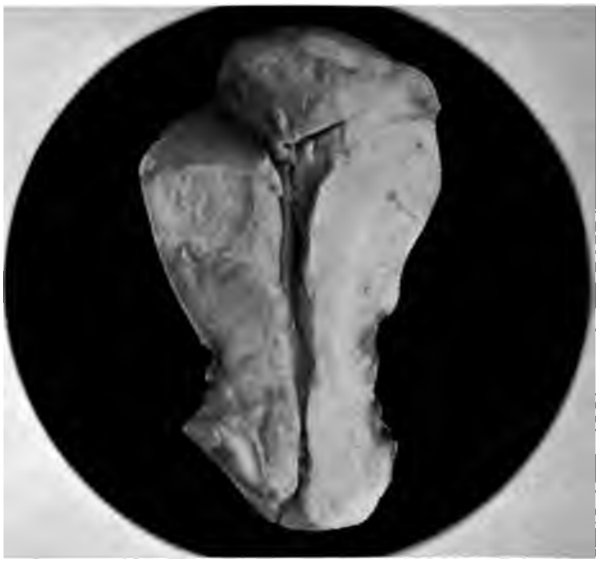


Fig. 515.—Hypertrophy of myometrium. Gross specimen from a nullipara, aged 41. The endometrium is only 3 mm. in thickness and shows moderate hyperplasia. The myometrium is 19 mm. thick and the increased thickness is due entirely to hypertrophy of the muscle and connective tissues. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

The diagnosis can only be made in uteri where previous inflammation and pregnancy can be excluded. The uterus is uniformly enlarged. The endometrium may share in the hypertrophy. Histologically there is no marked difference between the myometrium and that of the normal virgin uterus. The vessels are large and numerous, but have no thickened walls or any of the diffused degenerated elastic material characteristic of subinvolution.

The etiology of this condition, which usually occurs near the menopause, is not clear. It has no connection with inflammation. The pathology of this rather rare condition is well shown in Figs. 515 to 517. There are no

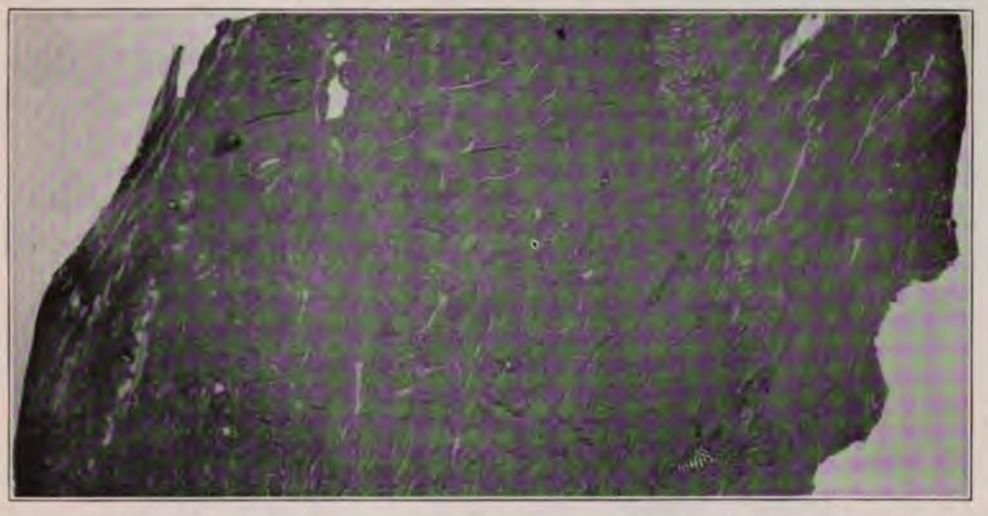


Fig. 516.—Hypertrophy of myometrium, with some hyperplasia of endometrium, from nullipara, aged 19. No subinvolution and no infection (see Fig. 517). Thickness of wall 24 mm. (myometrium 19 mm. and endometrium 5 mm.). Gyn. Lab.

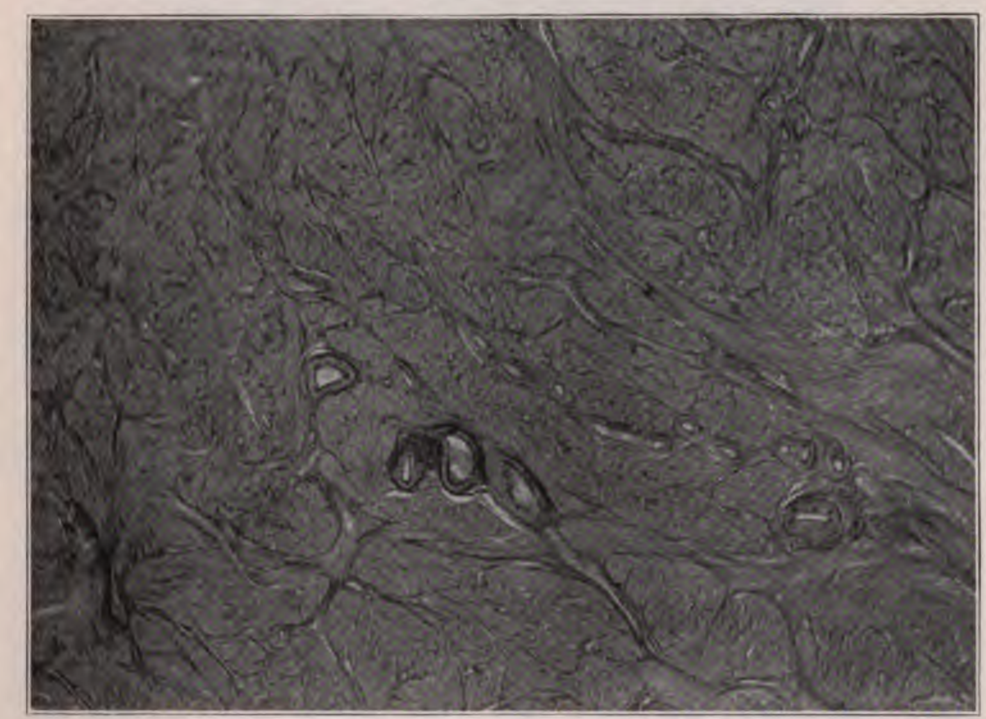


Fig. 517.—Hypertrophy of myometrium. High power of Fig. 516. Weigert-Van Gieson Stain, showing normal nulliparous distribution of elastic tissue and connective tissue and muscle tissue and muscle. In the original, the elastic tissue is stained black and of course reproduces black in the photomicrograph. Notice the normal distribution as a thin, clear-cut elastic intima inside the blood vessels. The connective tissue stains red and the muscle tissue yellow. The former reproduces as a rather dark network surrounding the lighter staining muscle bundles. Gyn. Lab.

characteristic symptoms. The treatment, when the condition causes disturbance, would be the same as for troublesome uteri enlarged from subinvolun or metritis.

CHRONIC METRITIS

Chronic metritis or chronic myometritis, is a late result of infection of the uterine wall. Symptomatically the diagnosis between subinvolution and chronic metritis is very difficult in women who have had children, since the same symptoms may be caused by either condition or by the two combined. However, chronic myometritis of an extent to be important clinically is not very common. Septic infection of the parous uterus usually runs an acute course and largely disappears, leaving subinvolution as the subsequent troublesome clinical entity.

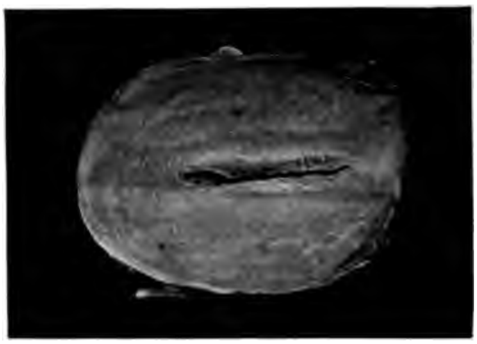


Fig. 518. Chronic metritis. Thickness of entire wall 20 mm. (myometrium 18 mm., endometrium 2 mm.) The thickening is moderate but is due entirely to round-cell infiltration and increased fibrous tissue. Gyn. Lab. (Schwarz, Am. Jour. Obst.)

A

Fig. [illegible] Uterus wall from a case of [illegible] Gyn. Lab.

B.

In the earlier stages of chronic metritis, there is an infiltration, especially of the intermuscular septa, with round cells. In other cases the infiltration is most marked around the blood vessels. This process may be kept up by reinfection from chronic infections of the cervix and tubes.

Later on this exudate is converted into fibrous tissue. The preponder-

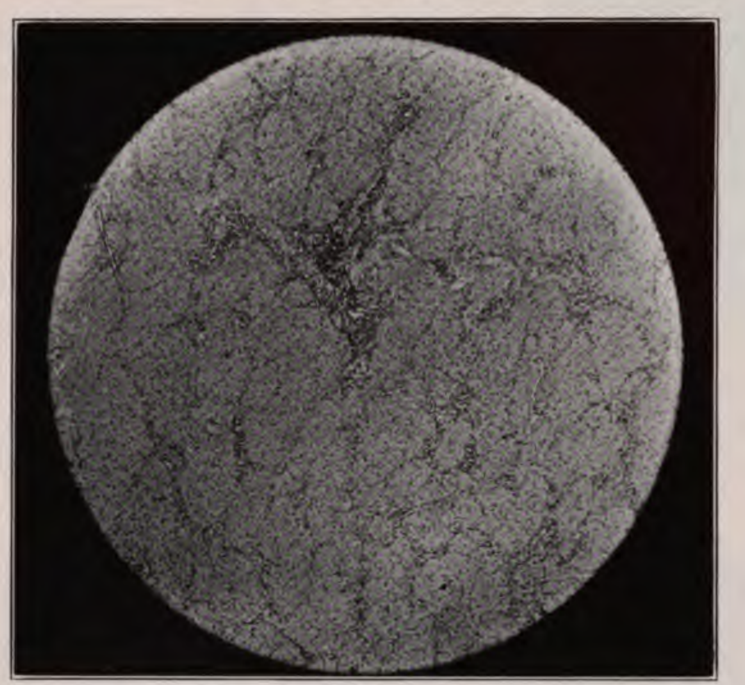


Fig. 520.—Chronic metritis. H & E stain, showing marked round-cell infiltration in the myometrium. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

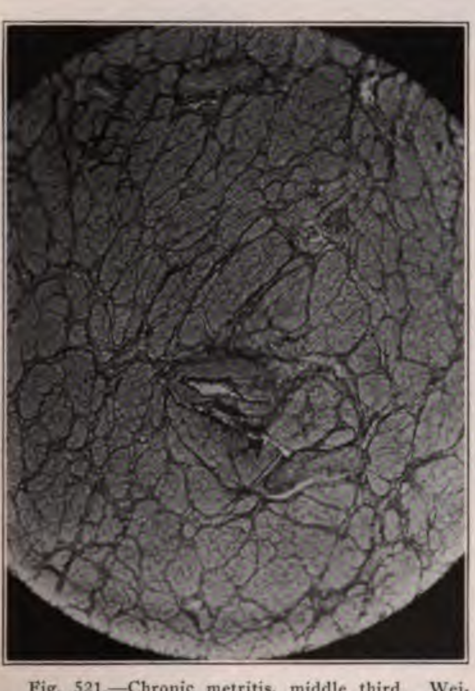


Fig. 521.—Chronic metritis, middle third. Weigert-Van Gieson Stain, showing connective increase and the absence of diffused elastic tissue. The connective tissue forms the rather dark network about the lighter staining muscle bundles. Notice the normal distribution of elastic tissue as a fine elastic intima inside the vessel near the center of the field. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

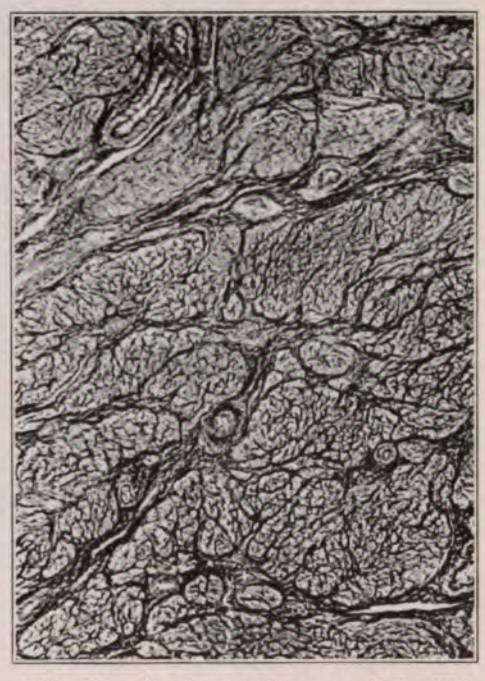


Fig. 522.—Chronic metritis, outer third. Weigert-Van Gieson stain, showing increased connective tissue, but without diffused degenerated black-staining elastic substance characteristic of subinvolution. Compare this photomicrograph with the one from a similar portion of the wall in a case of subinvolution, Fig. 514. The two are stained with the same stain. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

ance of fibrous over muscle tissue forms the more characteristic feature of chronic metritis. To demonstrate this, it is necessary to stain with von Gieson stain, which shows the muscle fibers yellow and the fibrous tissue red. Unlike subinvolution, the vessel walls are not much thickened and the diffuse black-staining elastic material is absent. The pathological characteristics are shown in Figs. 518 to 522.

In the early stages the uterus is large, soft, and boggy, but later it becomes hard, decreases in size, and, in extreme cases, may be smaller than the normal uterus. The small sclerotic, hypersensitive uterus, so-called "irritable uterus," is of this type. When this condition gives rise to persistent troublesome symptoms, hysterectomy is the most effective treatment, though deep x-ray therapy may be tried.

HYPERINVOLUTION OF UTERUS

Hyperinvolution is a very rare condition in which the process of involution following labor does not stop at the normal limit, but continues until the uterus is much reduced in size. The uterus sometimes becomes so small as to measure only an inch in depth. The cause of this trouble is deficient ovarian function. Obviously the condition in its more aggravated form is associated with amenorrhea. While formerly this amenorrhea of the lactation period commonly was regarded as the result of the atrophic condition of the uterus, at present the opinion prevails that the primary underlying cause is to be found in a deficiency of the internal secretory function of the ovary. The process of ovulation has stopped during pregnancy. After labor, during or after the lactation period, ovulation becomes reestablished as soon as the general condition of the woman, debilitated by pregnancy, labor, and lactation, has been restored to its normal level. During the period of cessation of ovulation no corpora lutea are formed. Ovarian hormones fail to stimulate the uterus. The result of this lack of stimulation is amenorrhea coincident with atrophy of the uterus. If the ovulation process by a long-continued lactation, especially in the generally weak woman, is interrupted for an unduly extended period, and the uterus thus deprived of the vegetative ovarian hormone for a very long time, the resulting uterine atrophy may become permanent. The woman has entered prematurely into her menopause (Ehrenfest, American Journal of Obstetrics, 1915). The principal symptom of uterine hyperinvolution is painful and scanty menstruation or amenorrhea. The treatment is not satisfactory. The same treatment is employed as for the dysmenorrhea and scanty menstruation of ovarian hypofunction (see Chapters XIV and XV).

Recently the author saw a most interesting case of hyperinvolution of the uterus and adnexa. The patient was thirty years of age. Three years previously she had had a severe infection following the birth of her child, and there had been no menstruation since. Pelvic examination showed the uterus to be very small. On account of other trouble it was necessary to open the abdomen, and thus the opportunity was given of inspecting the internal genital organs. Everything was atrophic—the uterus, ovaries, tubes, and round ligaments. The uterus was about half the normal size.

TUBERCULOSIS OF THE UTERUS

This term is applied to tuberculous disease of the uterine mucosa and myometrium. When the tuberculosis affects only the peritoneal coat of the uterus, it is classed as peritoneal tuberculosis.

Etiology

Tuberculosis of the uterus usually comes from tuberculosis of the tubes. Occasionally it is due to infection from without, in which case it may come from tuberculosis of the external genitals.

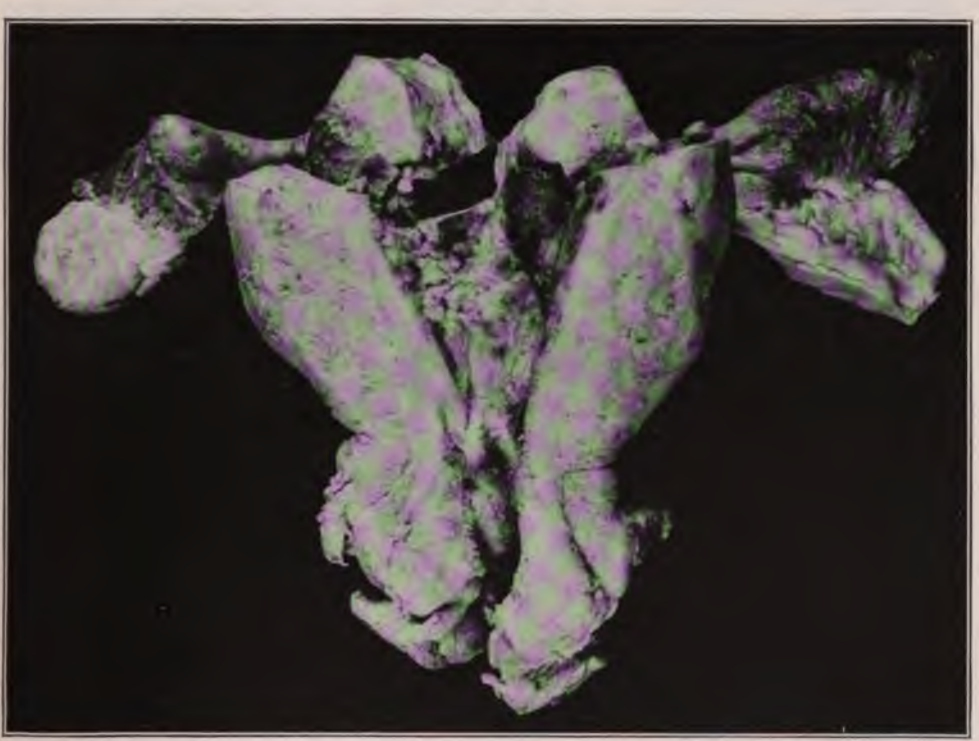


Fig. 523.—Tuberculosis of the endometrium. Gross specimen, showing the thickened endometrium, and also the accompanying tubes which were tuberculous. From a white woman in whom a part of the right tube had been removed in a distant city some years before and found tuberculous. Notice the stump of right tube in the photograph of the specimen. Gyn. Lab.

It may be produced by coitus with a tuberculous husband, the tuberculosis in the husband being located in the genito-urinary tract. It is possible for the infection to be carried in this way when the husband has only pulmonary tuberculosis, for tuberculous bacilli have been demonstrated in the comparatively healthy testes and semen of phthisical patients. Infection conveyed by coitus may be first manifested in the cervix or in the body of the uterus. It is held by some that such infection may be first found in the fallopian tubes. Tuberculosis of the uterus sometimes occurs as a part of a general infection, secondary to pulmonary tuberculosis.

Pathology

Tuberculosis, unlike gonorrheal infection, usually descends from the tubes (Fig. 523) or even the peritoneal cavity. Tuberculosis of the uterus and cervix is, therefore, usually secondary to tuberculous salpingitis. It may, however, be blood borne.

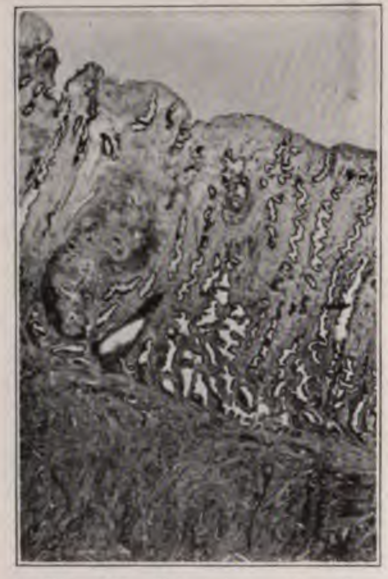


Fig. 524.—Tuberculosis of endometrium. Low power of section from the specimen shown in Fig. 523. A tuberculous area in the endometrium is well shown. Gyn. Lab.

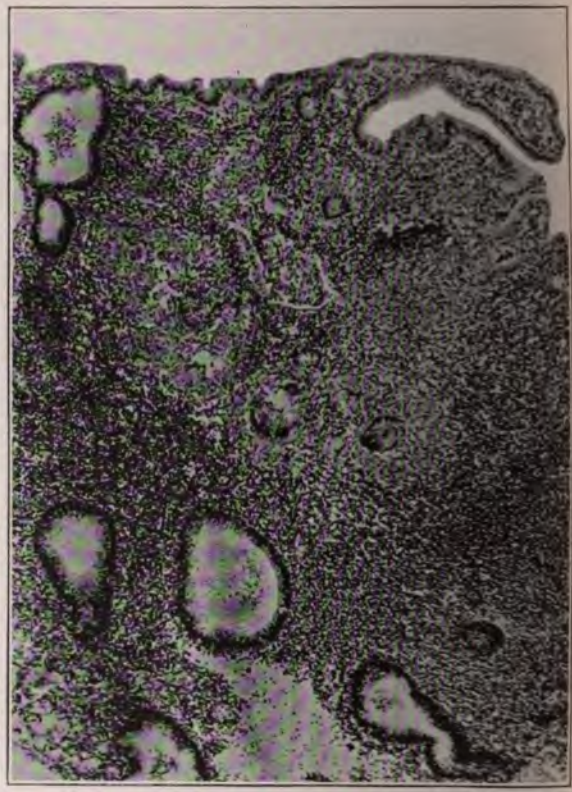


Fig. 525.—Tuberculosis of endometrium. High power of a section from the same case, showing typical tubercles and giant cells. Gyn. Lab.

In the uterus it affects primarily the endometrium. It presents the picture of tuberculosis elsewhere, namely, miliary tubercles consisting of round cells (Figs. 524, 525). These miliary tubercles may exist isolated in an otherwise normal endometrium.

Tuberculosis of the cervix may appear in the form of a chronic ulcer or, rarely, as condylomatous nodules. It is usually secondary to tuberculosis of the endometrium. The microscopic pathology is shown in Fig. 526.

Symptoms and Diagnosis

The symptoms of tuberculosis of the endometrium are principally those of a severe chronic endometritis. There is nothing particularly distinctive in the clinical evidences of tuberculous endometritis. A severe endometritis occurring in a virgin should arouse suspicion of tuberculosis. A persistent and severe chronic endometritis in the presence of peritoneal or tubal tuberculosis or occurring in a patient with phthisis, is possibly tuberculous. The diagnosis is made by finding tubercle bacilli in the pus or finding characteristic changes in the scrapings from the uterus.

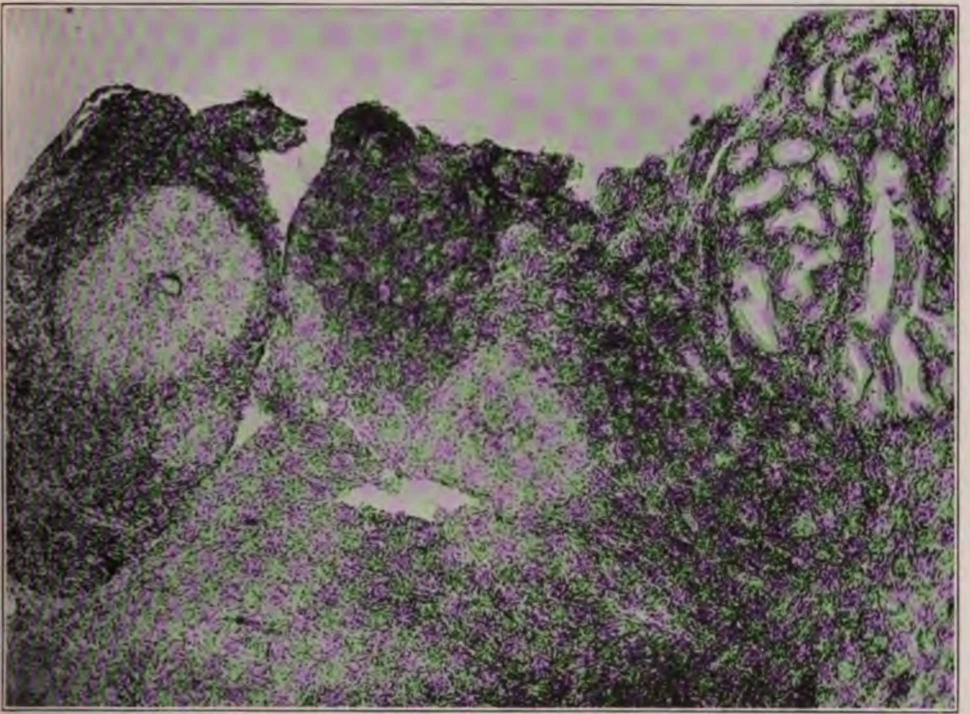


Fig. 526.—Tuberculosis of the cervix uteri. Notice the cervical glands at the right and the exceptionally well formed tubercle with giant cell at the left. There are several tubercles which show a tendency to coalesce. The patient was an eighteen-year old nulliparous colored girl. Wassermann negative, and persistent antiluetic treatment had no effect on the lesion. The microscopic picture was typically tuberculous, with the characteristic caseation which distinguishes these tubercles from the gummata of syphilis. Gyn. Lab.

Treatment

In all cases, give general antituberculosis treatment. Tuberculosis of the lower part of the cervix alone, calls for amputation of the cervix or hysterectomy. Tuberculosis of the body of the uterus indicates hysterectomy (usually vaginal), provided there is no other involvement, e. g., advanced phthisis or very extensive peritoneal involvement. A moderate involvement of tubes and pelvic peritoneum is not a contraindication to operation, provided the patient is in a fair general condition. In cases in which the patient is not in fit condition for radical operation, or refuses the same, the case is treated on the same general principles as chronic endometritis, that is, by curettage, followed, if necessary, by antiseptic and astringent applications. Iodoform should be used freely, in powder or emulsion or as soluble bougies. While a cure may, in some cases, follow this mild treatment, its attainment is very uncertain, and owing to the impossibility of determining the limit of the uterine infiltration and owing also to the fact that the infiltration is very likely to spread in spite of all treatment, hysterectomy is the safer plan and the one to be advised.

SYPHILIS OF THE UTERUS

In a most exhaustive monograph Gellhorn and Ehrenfest (American Journal of Obstetrics, 1916) have presented the entire problem of the involvement of the internal female genitals by syphilitic infection.

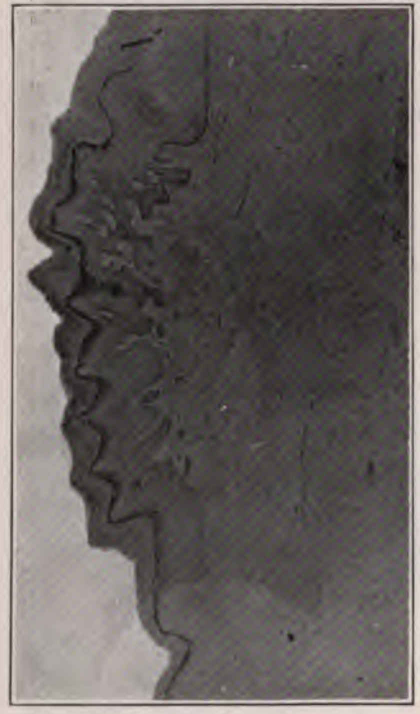


Fig. 527.—Syphilis of cervix, secondary. Section through a slightly elevated grayish white placque a little less than 1 cm. diameter. At the bottom of the picture the epithelium is practically normal. In the lesion, note the regular character of the epithelium and its line of demarcation, the marked development of the epidermis, and the marked stratum granulosum, which is scarcely apparent in normal cervical epithelium. Gyn. Lab.

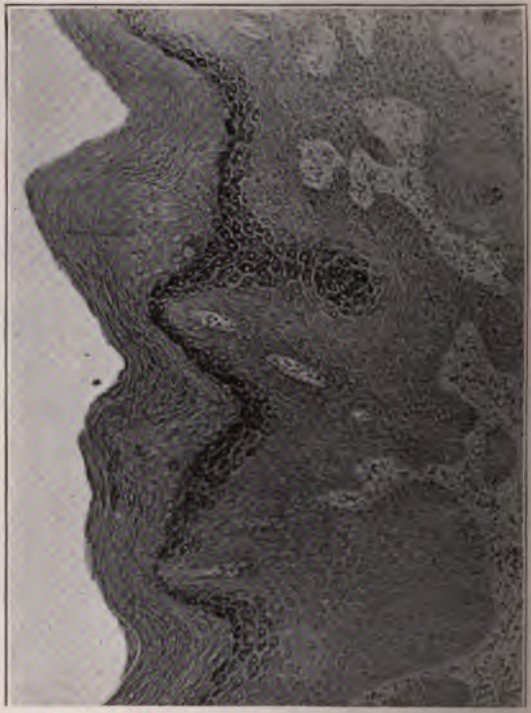
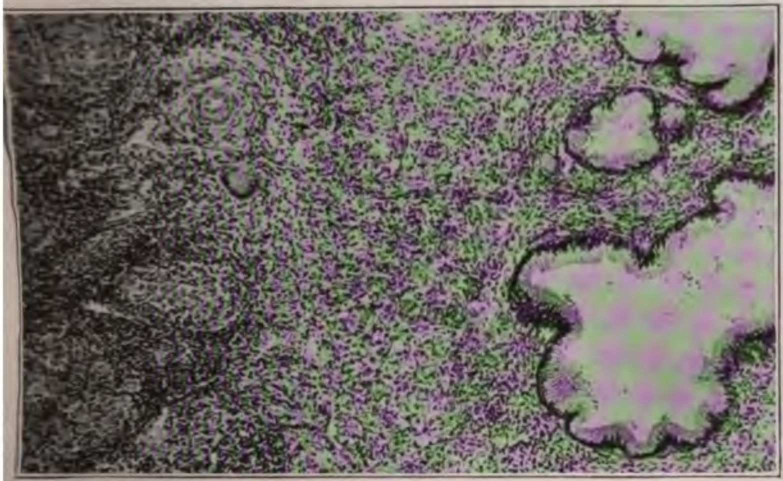
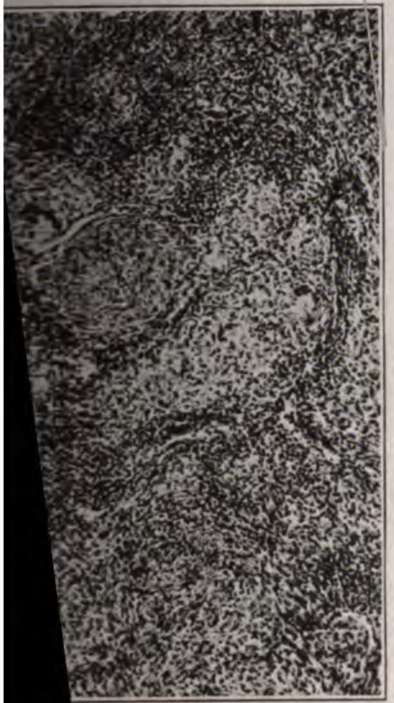


Fig. 528.—High power of the upper central portion of Fig. 527. Shows the squamous epithelium in which the cells have a definitely water-logged appearance. The epithelium is markedly hypertrophic and presents the characteristic underlying irregular surface. Note the large cells of the stratum granulosum and also the well developed stratum corneum. Gyn. Lab.

The cervix comparatively often is the seat of a primary chancre. Secondary manifestations in form of macules and papules may be found on the surface of the cervix Figs. 527, 528). Of an eminently practical importance is the development of a tertiary gummatous growth in the cervix (Figs. 529,



529.—Syphilis of cervix, tertiary. Note the cervical glands at the right and the gumma cell at the left. The patient had a two-plus Wassermann. Guinea pig injections negative ulosis. The cervix returned to normal after vigorous antisyphilitic treatment and caused no able. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)



ilis of cervix, tertiary. Another pecimen shown in Fig. 529, show- all gummata, each containing a ab. (Schwarz—*Am. Jour. Obst.*)

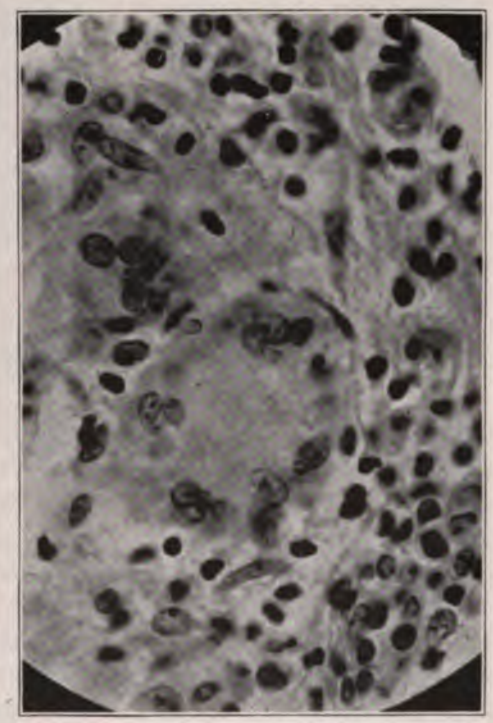


Fig. 531.—High power of one of the typical giant cells seen throughout this lesion. Gyn. Lab. (Schwarz—*Am. Jour. Obst.*)

hile at first of a firm consistence, it usually breaks down as the otic changes. An irregular-shaped deep ulcer surrounded by l tissue forms, which as shown by these writers, often has been ervical carcinoma.

Our actual knowledge concerning the syphilitic lesions of the uterine body is extremely meager. Primary and secondary manifestations have not been observed in the uterus. There are a few instances of gumma in the uterine wall on record, also of a gummatous endometritis. This infrequency of tertiary lesions is rather a matter of surprise, for the uterus more than any other internal organ of the body is exposed to direct infection. Spirochetes may reach the endometrium from the vagina or from cervical lesions. Spirochetes, at least during pregnancy, undeniably circulate through the uterine wall as is proved by the fact that an actively syphilitic mother invariably infects the fetus in the uterus. The investigations of Gellhorn and Ehrenfest tend to show that it is not justifiable to speak, as various writers are doing, of a typical syphilitic metrorrhagia presumably caused by definite pathologic changes in the myometrium.

Syphilis is a common cause of abortion. It is this frequency of abortions in luetic women and the notorious complication of a luetic with a gonorrheal infection in the same individual which account for the established fact that women with a strongly positive Wassermann reaction so often exhibit metrorrhagia as a predominant symptom. The diagnosis of a syphilitic affection of the cervix is made from the more or less characteristic appearance of the lesion in an evidently syphilitic woman with a positive Wassermann reaction and is rendered positive by the finding of spirochetes in a smear made from the serous exudates covering the lesion. In suspicious-looking ulcers the microscopic study of an excised piece of tissue becomes indispensable. A wrong diagnosis of carcinoma may prove disastrous to the patient.

Luetic affections heal very readily, especially under specific general treatment, the only treatment actually required in these cases.

ECHINOCOCCUS DISEASE OF UTERUS

Echinococcus disease affecting the uterus is a curiosity, and yet it is not so rare that it can be ignored in diagnosis. Undoubted cases have been reported in early life and in middle life and later. The liver is the organ usually affected in echinococcus disease. Many other organs, however, have been affected, with or without coincident affection of the liver, and among the organs occasionally affected is the uterus.

When echinococcus disease attacks the uterus (Fig. 532), there is nothing especially characteristic in the symptoms. The disease, at first, may resemble chronic endometritis with hemorrhagic tendency. As the cysts become larger, a tumor or several tumors become palpable, and the case may be considered one of uterine fibroids. When the masses become still larger, fluctuation may be detected or rupture into the uterine cavity may take place with the discharge of clear fluid and hooklets (Fig. 533) and daughter cysts. If rupture takes place into the peritoneal cavity, fatal peritonitis is probable. The process may stop at any stage and the lesion undergo partial absorption. Suppuration may take place in the lesion, forming abscesses. In some cases the symptoms resemble pregnancy, as mentioned by Reed, as follows:

"In cases of echinococcus infection of the uterine cavity, the symptoms may be essentially those of pregnancy. The uterus becomes enlarged and softened, the cervix presenting a bluish aspect. The womb enlarges, progressively and symmetrically, the breasts enlarge and may contain milk, while there are, not infrequently, reflex disturbances of the stomach. It is the occurrence of these symptoms which has generally caused infections of the uterine cavity by echinococcus to be looked upon as pregnancy, and the resulting cysts to be designated as degenerated ova. In practically all these cases, however, the usual amenorrhea of pregnancy is absent, while the patient complains of more or less constant dribbling of blood from the uterus. While this is true, the fact must be recognized that infection of the uterine cavity may coexist with pregnancy, as was true in MacNeven's case, in which a large echinococcus cyst was expelled intact, during a true labor and immediately preceding the rupture of the amniotic sac. The exact diagnosis cannot be made without the demonstration of the hooklets."

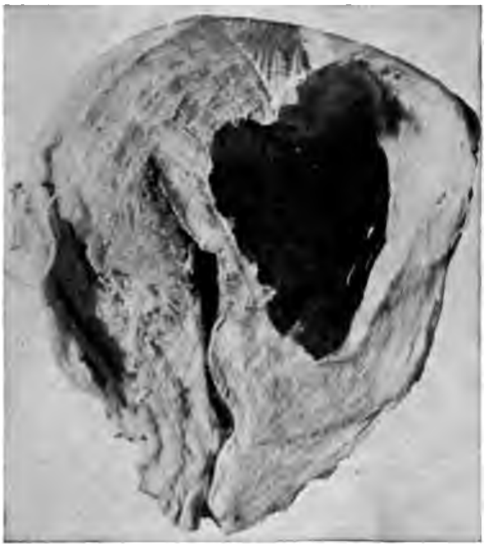


Fig. 532.—Echinococcus disease of the uterus. Gross specimen showing an echinococcus cyst of the uterine wall. (Turenne—*Surg., Gyn. and Obst.*)

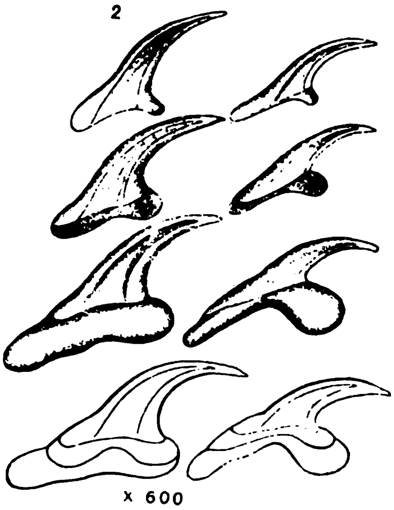


Fig. 533.—Echinococcus hooklets. The diagnosis of echinococcus disease depends upon finding these characteristic hooklets in the cyst fluid.

Echinococcus disease of the uterus must not be confounded with the more common "hydatid mole," in which small cysts of varying size are found, and may be expelled in a large mass. The two affections are entirely distinct. The first (echinococcus disease) is due only to the echinococcus parasite in the uterus, while the second (hydatid mole) is due to degenerative changes in fetal membranes—the chorionic villi proliferating and becoming distended with fluid so as to form a mass of little cysts. This affection (hydatid mole) is rather frequent and is described in obstetric works. Occasionally the degenerating chorionic villi take on malignant characteristics and give rise to that form of uterine tumor known as chorioepithelioma.

The differential diagnosis between echinococcus disease and hydatid mole is made by microscopic examination of the pathologic structures—hooklets being found in the first and chorionic villi in the second.

The treatment of echinococcus disease of the uterus consists in the rupture and continual drainage of all cyst cavities, combined with the use of the antiseptics and astringents recommended for endometritis. If the disease persists and is not associated with some contraindicating lesion, hysterectomy is indicated.

CHAPTER VII

DISPLACEMENT OF THE UTERUS

POINTS IN ANATOMY

The uterus is situated about the center of the pelvic cavity (Figs. 534, 535) with the body of the organ inclined forward, the long axis of the organ being directed to a point above the symphysis pubis, the direction varying in different individuals and in the same individual at different times. The uterus is not fixed in one position, but can be moved easily in all directions—upward, downward, forward, or laterally. It is pressed somewhat backward in the pelvis when the bladder is distended and somewhat forward when the upper part of the rectum is distended.

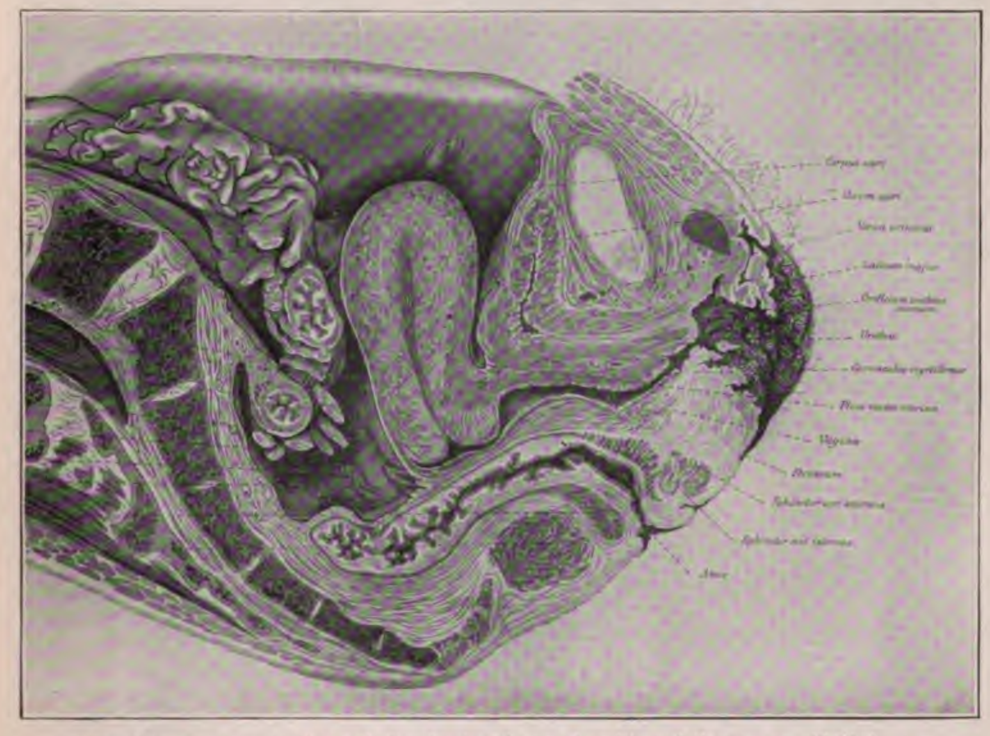


Fig. 534.—Section of a frozen body, showing the usual position of the uterus. (Sellheim—*Weibliches Becken.*)

It is seen, therefore, that the uterus possesses normally a considerable range of mobility, and it is only when it is found beyond the normal range that it can be said to be displaced.

What Holds the Uterus in Normal Position? As just stated, there is nothing that holds the uterus immovably in any one position. By a combination of several factors it is prevented, ordinarily, from going beyond certain limits, and is permitted free mobility within those limits.

The factors that thus assist in maintaining the uterus within normal limits, or rather assist in preventing its remaining permanently beyond the normal limits, are the following:

The pelvic floor (Figs. 361 to 367).
The sacro-uterine ligaments (Figs. 4, 450).
The broad ligaments (Figs. 4, 450, 451).

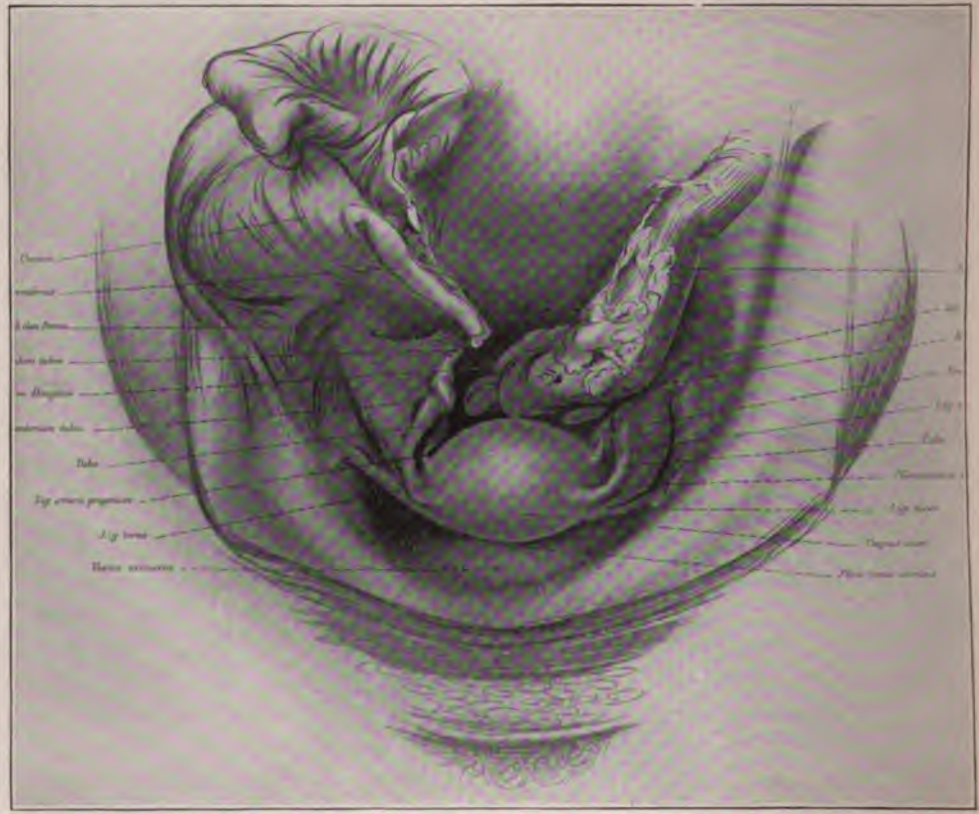


Fig. 535.—A view from in front, showing the usual position of the uterus. This is the same frozen body shown in Fig. 534. (Sellheim.—*Weibliches Becken.*)

The round ligaments (Figs. 5, 450).
The normal weight and size of the uterus.
The normal tone and fullness of the pelvic tissues.

A large heavy uterus tends to downward displacement and backward displacement more than one of normal size. After the menopause the atrophy of muscular tissue and absorption of fat may so interfere with the normal tone and fullness of the tissues as to be a factor in prolapse of the uterus. The previous laceration of the pelvic floor in these cases was not sufficient in itself to cause the prolapse.

BACKWARD DISPLACEMENT OF THE UTERUS

Backward displacement of the uterus occurs in two forms—retroversion and retroflexion (Figs. 96 to 99). In **retroversion**, the uterus as a whole is *turned* backward, the relation between the cervix and the body remaining the same. In **retroflexion**, the upper part of the uterus is *bent* backward, the point of bending being about at the internal os. The cervix may retain its normal position in the pelvis but its relation to the fundus uteri is, of course, much changed.

In nearly all cases of backward displacement of the uterus, there is both a retroversion and a retroflexion. The causes of these two displacements are about the same, the symptoms are much the same, the treatment is practically the same and, as the two conditions are nearly always associated, they should be considered together. "Retrodisplacement" is the term the author shall generally use in referring to a backward displacement of the uterus. It includes retroversion and retroflexion and the combination of the two.

Etiology

A consideration of the factors concerned in maintaining the uterus within the limits of normal position will indicate in a measure the causes of displacement. It is seldom, however, that one factor alone is affected, but usually several. There are various ways of classifying the causes of retrodisplacement of the uterus. The author finds the following classification satisfactory and convenient in actual work:

A. **Causes Connected With Labor or Miscarriage.**

1. **Injury of the Pelvic Floor** and accompanying relaxation of other supporting structures.
    - a. PELVIC FLOOR—laceration unrepaired, overstretching or subsequent subinvolution.
    - b. SACROUTERINE LIGAMENTS—overstretching or subinvolution.
    - c. BROAD LIGAMENTS, round ligaments and other pelvic tissues— overstretching or subinvolution.
    - d. VAGINAL WALL—overstretching or subinvolution, producing subsequent dragging on cervix.
2. **Subinvolution of Uterus** following labor or miscarriage—
    - a. OF CORPUS, due to infection or to placental remnants or blood clots retained, or to an atonic condition of uterus from other cause (anemia, poor pelvic circulation).
    - b. OF CERVIX, due to laceration with infection of cervical tissue, or to persistent relaxation or atonic condition from other cause.
3. **Scars** in upper part of vagina, drawing cervix forward.
4. Getting **up too soon** after labor or at work too soon (displacement is favored by the heavy uterus and the relaxed vaginal wall and pelvic floor).
5. Constant **dorsal position** after labor or miscarriage,

B. **Non-puerperal Changes in Uterus.**
  1. In the **cervix uteri.**
    a. Inflammatory hypertrophy.
    b. Idiopathic hypertrophy.
    c. Tumors.
    d. Undue dragging down, in examinations and operations.
  2. In the **corpus uteri.**
    a. Inflammation—increasing the weight of the uterus so that it drags on its supports. Also, in some cases, by causing softening and lack of tone in the walls so that the organ bends backward more easily on occasion, and does not possess the tonic elasticity to return to its former shape.
    b. Tumors in the anterior wall or the posterior wall or in the interior of the uterus. And also projecting polypi.
    c. Senile atrophy.
    d. Displacement and failure to replace, in examination or operation.

C. **Non-puerperal Changes in the Supporting Structures.**
  1. Relaxation and stretching from certain kinds of **work.**
  2. Relaxation and stretching from **faulty dress.**
  3. Relaxation and stretching from **full bladder** (pushing fundus back) or **full rectum** (pushing cervix forward).
  4. Stretching by conditions that increase the **intraabdominal pressure** (persistent cough, straining efforts from stricture of rectum or from chronic bladder disease, etc.).
  5. Relaxation from general **atonic conditions** (anemia, etc.). This is often accompanied by general poor support of the abdominal organs (splanchnoptosis or enteroptosis), due to repeated pregnancies with poor recuperation afterward or to other cause.
  6. Stretching in examinations and **operations.**
  7. **Absorption** of muscle and fat in pelvis, due to wasting disease or to senility. This is one of the important factors in prolapse and retrodisplacements that come on after the menopause.

D. **Pelvic Tumors.**
  1. **Ovarian** and **Broad Ligament** tumors.
  2. **Other Tumors** arising in the pelvis or extending into the pelvis.

E. **Pelvic Inflammation.**
  1. **Cellulitis** in front of uterus with the formation of contracting tissue, drawing cervix forward.
  2. **Peritonitis,** principally perisalpingitis and perioophoritis forming adhesions with the intestines and the pelvic wall, which adhesions contract later and tend to drag the fundus uteri backward.
  3. Chronic **oophoritis** (follicular), increasing the weight of the ovary, and prolapse of ovary, tending to drag the uterus backward. Also chronic **salpingitis** may cause thickening of the tubes and prolapse backward and dragging on fundus uteri.

F. **Developmental Defects** (congenital causes), often the expression of general infantilism (Chapter XV).

1. **Short Vagina**, holding cervix too far forward.
2. **Long Cervix** held forward by the pelvic floor, so that the body of uterus must be either in backward displacement or be sharply flexed forward on the cervix.
3. **Imperfect Descent of Ovary**, causing the upper posterior part of the broad ligament to draw backward.

G. **Falls**, which may occasionally cause temporary displacement.

Pathology

The essential pathologic change is indicated in the name and in the definition. The amount of backward displacement may be very conveniently expressed as first or second or third degree. In retrodisplacement of the first degree, the fundus lies just about at the promontory of the sacrum, in the secon [illegible] in the hollow of the sacrum, while in the

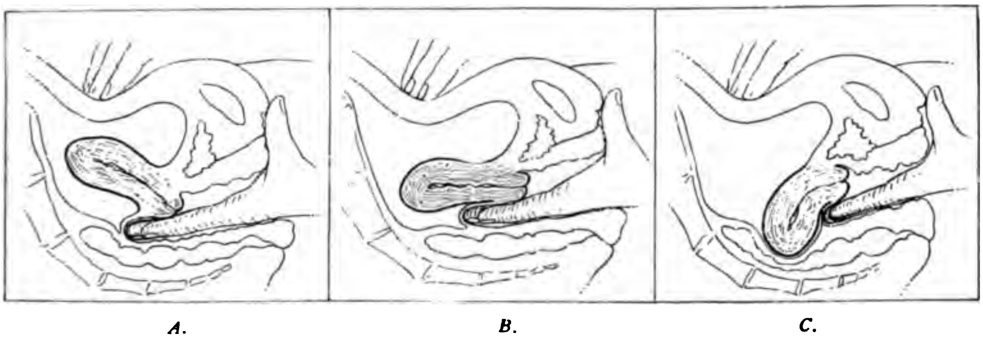


Fig. 536.—The three degrees of retrodisplacement of the uterus and the touch signs of each. *A*, First degree—corpus out of reach of examining fingers, both above and below. *B*, Second degree—vaginal fingers feel posterior surface of corpus uteri extending directly back. *C*, Third degree—vaginal fingers impinge on corpus uteri turned down into the posterior culdesac.

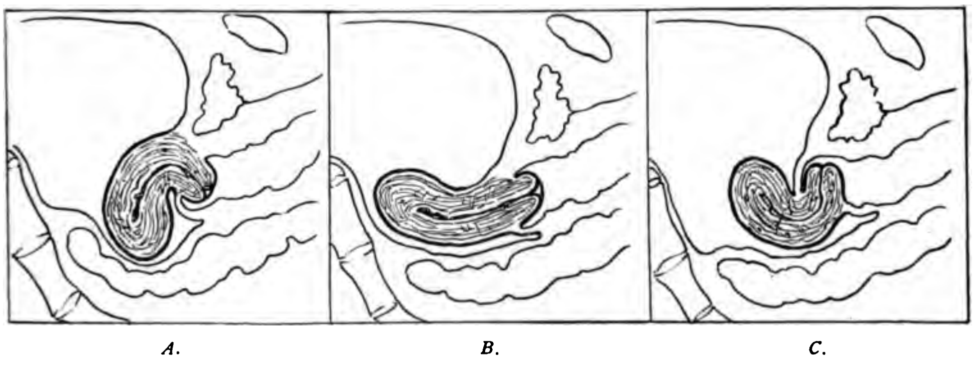


Fig. 537.—Retroflexion and retroversion of uterus. *A*, Pure retroflexion, the corpus uteri being *bent* sharply back while the cervical axis is maintained in its usual relation with the vagina. *B*, Pure retroversion, the whole uterus being *turned* back while the relation of the corpus to the cervix is undisturbed. *C*, Retroversion of a uterus with an anteflexed cervix.

A pure retroflexion or pure retroversion is a rarity, nearly every case being a combination of the two, hence the use of the term "retrodisplacement" which covers both flexion and version.

third degree it lies well down in the culdesac below the level of the internal os (Fig. 536). Of course in practice all gradations are found, from the normal position to the most marked backward displacement. The exact dividing line between the different degrees is not distinct and the division into first and second and third degrees is an artificial one but very convenient, and usually cases on examination may be easily placed in one class or the other and so recorded.

The association of version and flexion is almost constant, a pure retroversion or a pure retroflexion being rare (Fig. 537). The most common lesion is that in which the uterus is **turned** backward far enough for the cervix to point forward and then it is **flexed** still further. The cervix is found pointing more or less towards the vaginal orifice, the body of the uterus is absent in front and is found posteriorly, at the promontory or in the hollow of the sacrum or low in the culdesac (Fig. 536).

The broad ligaments are twisted more or less and the return circulation through them is impeded. This causes chronic congestion of the uterus, engorgement, cellular infiltration, simple endometritis and hypertrophy.

If the displacement follows labor or abortion, it interferes with the normal process of involution and causes subinvolution. If it is accompanied with infection, it aggravates the resulting inflammation.

If it occurs with laceration of the pelvic floor (and the association is very common), it increases the distress of that condition and tends to cause prolapse, by increase in the weight of the uterus and also by bringing the *point* of the uterine wedge (instead of a broad surface) to press against the weak place in the pelvic floor (Fig. 565).

The fundus as it goes back in the pelvis frequently takes the tube and ovary of one or both sides with it to some extent. The ovaries are the structures the more frequently displaced, and one or both of them may be found in the hollow of the sacrum close to the displaced fundus, or even below it in the culdesac. This irritation of the ovaries may result in their functional hyperactivity (Chapter XV).

In many cases there has been inflammation in the fallopian tubes, resulting in peritoneal exudate and adhesions. These adhesions fasten the uterus more or less firmly in its abnormal position. They may hold the uterus almost immovable, or they may be so long as to permit the uterus much latitude in movement, but will not permit it to come entirely forward. Again, if the adhesion is to a movable structure, such as an intestinal coil or the sigmoid, the uterus may be brought forward temporarily but is soon drawn back into the abnormal position.

There is a rare condition known as "retrodisplacement with anteflexion," in which an anteflexed uterus, while maintaining its anteflexion, becomes turned backward so that the fundus lies in the posterior part of the pelvis (Fig. 537-C).

Symptoms

The symptoms accompanying retrodisplacement of the uterus are due principally to the complications. There has been some question as to whether uncomplicated retrodisplacement causes any symptoms. It may be said that retrodisplacement, as met with in actual work, is rarely without symptoms. Occasionally a uterus is found in backward displacement without any symptoms referable directly or indirectly to it. But as a rule, retrodisplacement causes symptoms or aggravates symptoms due to some other disturbance.

The principal symptoms are BACKACHE, a sense of WEIGHT in the pelvis, and MENORRHAGIA. Sometimes only one and sometimes only two of these symptoms are present, but most frequently all of them are complained of.

In the **menorrhagia**, the increase in the menstrual flow is usually moderate only, and more marked in the amount than in the duration. It is not always present. In a certain proportion of the patients, the menstrual flow remains unchanged, and in some it is diminished.

Sometimes in young women, the menorrhagia is the only symptom. This menorrhagia from retrodisplacement may be the cause of delayed menopause. When the menorrhagia is pronounced and long continued, it leads to severe anemia and marked deterioration of the general health.

The **backache** is usually located low over the sacrum and occasionally there is also much pain in the region of the coccyx (coccygodynia). Occasionally the backache extends higher along the spine. It is more commonly found in long-standing retrodisplacement and in the complicated cases—particularly those complicated with pelvic inflammation. Painful menstruation present is not so evidently due to the displacement, as is the menorrhagia.

Leucorrhea is usually present, but is due to the displacement only secondarily, being caused by the chronic congestion of the endometrium and resulting excessive glandular secretion and endometrial hyperplasia. **Bladder** and **rectal** disturbances are sometimes present, especially when the uterus is large and the fundus is displaced far down in the culdesac, compressing the rectum or pressing the cervix forward against the bladder.

Sterility is, in some cases, apparently due to retrodisplacement, though not so frequently as to anteflexion of the cervix and the associated conditions. Not infrequently in a married woman who has been long sterile, pregnancy follows correction of the displacement. Occasionally the pregnancy follows so promptly as to leave little doubt that the sterility was occasioned by the displacement itself (compression of the tubes?) and not by any associated inflammatory trouble in the cervix or body of the uterus.

Repeated Abortion without apparent cause is another condition that should arouse suspicion of uterine retrodisplacement. **Reflex symptoms,** headache of various kinds and stomach disturbance or functional nervous disturbance, are occasionally apparently due to a retrodisplacement, but on the whole the frequency of reflex symptoms is probably exaggerated.

Diagnosis

The symptoms mentioned are common to many diseases and hence are **not at all distinctive** of retrodisplacement. The **diagnosis** of retrodisplacement **must rest** upon the physical examination. In examining the patient it is found usually that the cervix is lower and farther forward than is normal, and that it also points forward.

When making the bimanual examination, search is made for the body of

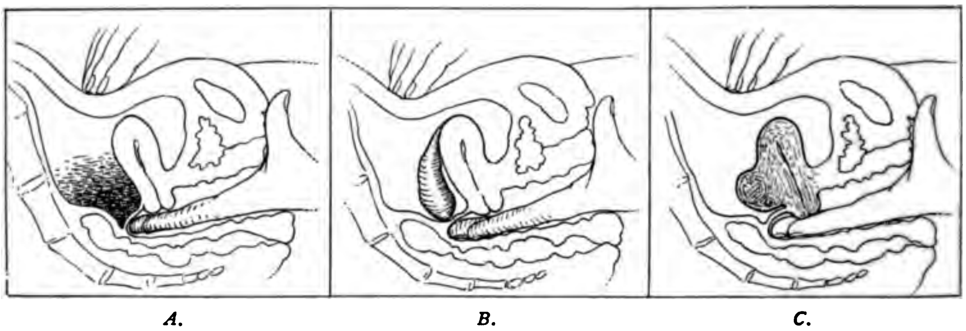


Fig. 538.—Differential diagnosis of retrodisplacement of uterus. Conditions simulating retrodisplacement. *A*, Inflammatory exudate in the culdesac, which may be mistaken for retrodisplacement when corpus uteri is not identified above on account of a thick or tense abdominal wall. *B*, Tubal mass in culdesac simulating the corpus uteri in that situation. *C*, Myoma of the posterior uterine wall which may cause considerable difficulty in differential diagnosis from retrodisplacement.

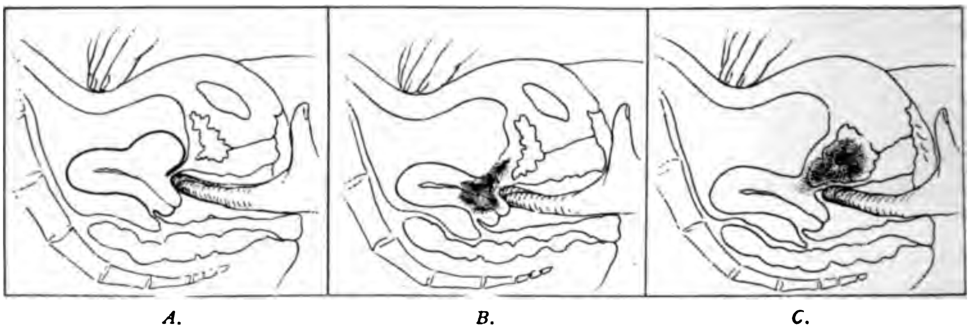


Fig. 539.—Differential diagnosis of retrodisplacement of uterus. Conditions that may obscure a retrodisplacement. *A*, Myoma of anterior uterine wall that simulates the corpus uteri. *B*, Uterine carcinoma with infiltration in front of cervix that may be mistaken for the resisting corpus uteri. *C*, Tumor of bladder that gives a resisting mass in the general position of the corpus uteri.

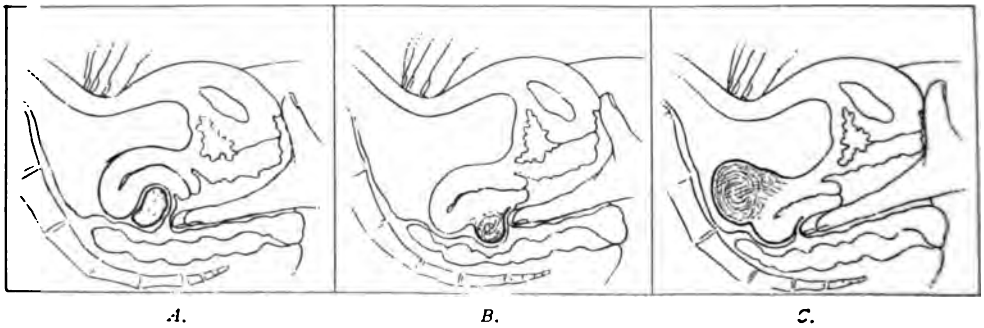


Fig. 540.—Differential diagnosis of retrodisplacement of uterus. Complicated cases of retrodisplacement. *A*, Adnexa prolapsed under the retrodisplaced uterus. *B*, Myoma in the posterior wall of the retrodisplaced uterus. *C*, Myoma on the anterior part of the fundus of the retrodisplaced uterus.

the uterus in its normal location, by placing the ends of the fingers in the vagina in the front of the cervix and pushing the cervix upward and backward and at the same time pressing the fingers of the other hand into the pelvis from above. In retrodisplacement it is not there (Fig. 97). Then placing the vaginal fingers back of the cervix and making bimanual examination (Figs. 98, 99), a mass is found back of the cervix, which is about the size and shape of the body of the uterus and apparently continuous with the cervix. This is the body of the uterus in its backward position.

If the uterus is in only the first degree of retrodisplacement (Fig. 536-A), the fundus may be so high as to be out of reach of the vaginal fingers, and yet far enough back to be out of reach of the fingers above. The difficulty is much increased if the patient holds the abdominal muscles rather tense. In these cases the body of the uterus may sometimes be raised so it can be felt by the abdominal hand by pushing up the cervix with the fingers in the vagina. This lifts the whole uterus—body and all. If the displacement is marked (that is, second or three degree) the fundus can usually be felt by the vaginal fingers, back of the cervix (Fig. 536). When a mass is felt in front or behind the cervix, it must then be determined whether or not it is the corpus uteri. Figs. 538 to 541 show the principal conditions that must be taken into consideration in the differential diagnosis.

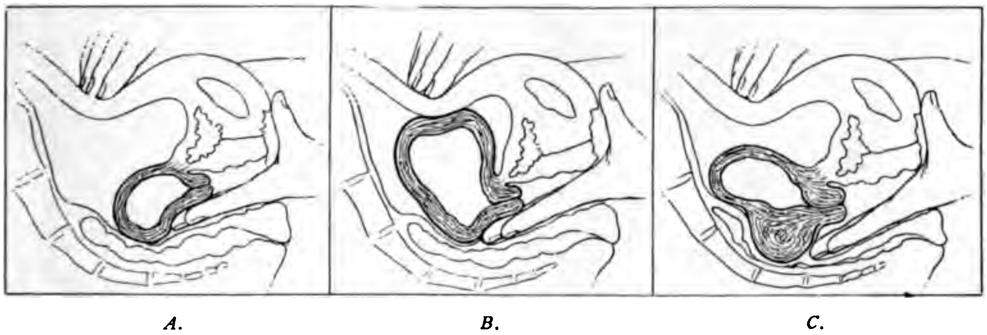

A. *B.* *C.*

Fig. 541.—Differential diagnosis of retrodisplacement of uterus. Confusing conditions, associated with early pregnancy. *A*, Retrodisplacement with early pregnancy. *B*, More advanced pregnancy with sacculation of the softened wall posteriorly. *C*, Retrodisplacement with early pregnancy and a myoma in the posterior uterine wall. Keeping the possibility of such troublesome combinations in mind will often save an embarrassing mistake in diagnosis.

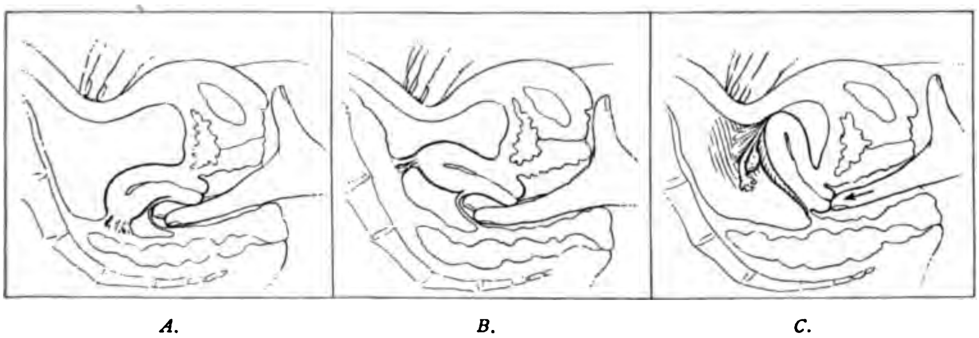

A. *B.* *C.*

Fig. 542.—Determining the presence and extent of adhesions in retrodisplacement of the uterus. *A*, The fundus uteri adherent low posteriorly. It cannot be gotten away from this region. *B*, Adhesions higher. These usually permit considerable movement of the fundus uteri but it cannot be raised high enough to be caught with the abdominal fingers. *C*, Light adhesions in the adnexal region. The fundus can usually be raised high enough to be caught with the abdominal fingers but does not come well forward or will not stay forward when released.

The differential diagnosis is made by making out the position, size, shape, consistency, tenderness, mobility and attachments of the mass, as explained under Gynecologic Examination (Chapter I).

Determine Mobility.—After having determined that the body of the uterus is backward, and about how far backward, the next point to determine is whether or not it is freely movable. The vaginal fingers are pressed well in under the fundus and an attempt is made to lift it (Figs. 542, 543). If it cannot be raised from its position, it is fixed. The fixation may be due to adhesions or to the fundus being caught under the promontory of the sacrum. To determine which condition is present, catch the cervix with the tenaculum forceps and pull it downward and forward (Fig. 544). This maneuver pulls the uterus forward and away from the promontory. Then, while holding the uterus in that position, the fundus may be lifted past the promontory (Fig.

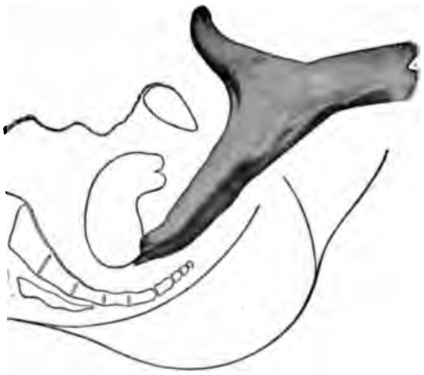


Fig. 543.—Attempting to raise the fundus uteri, to determine whether or not it is fixed. This is also the first step in bimanual replacement of the uterus. (Pryor—*Gynecology*.)

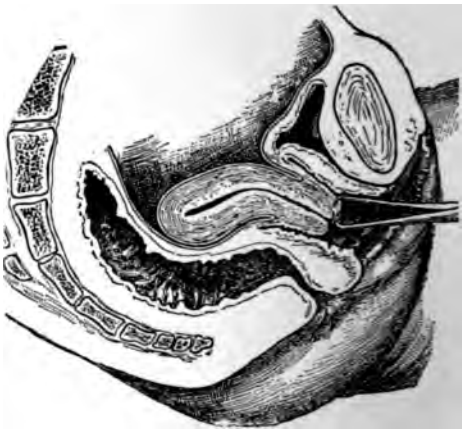


Fig. 544.—Bimanual replacement. Catching the cervix and pulling forward the uterus, so the fundus will be clear of the sacral promontory. (Kelly—*Operative Gynecology*.)

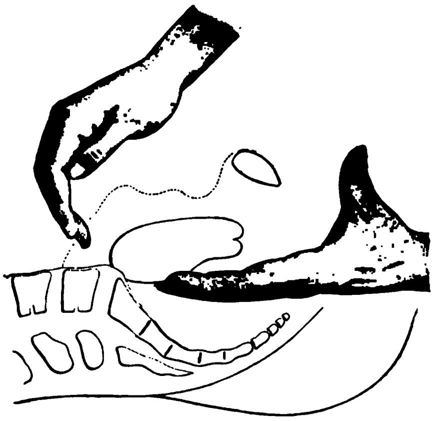


Fig. 545.—Bimanual replacement. Raising the fundus uteri past the sacral promontory. (Pryor—*Gynecology*.)

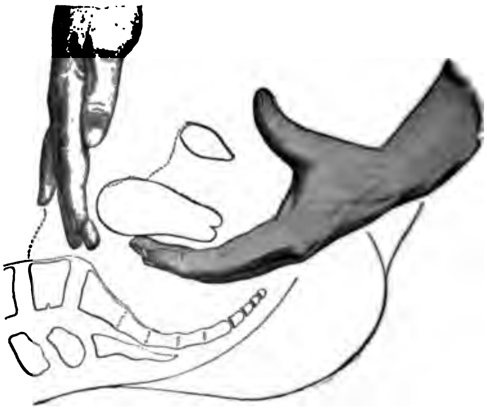


Fig. 546.—Bimanual replacement. Working the abdominal fingers down over the sacral promontory, so as to get behind the fundus uteri and bring it forward. (Pryor—*Gynecology*.)

545), provided it is not otherwise held. If still the uterus cannot be raised, it is probably **adherent**—i.e., fixed in its false position by adhesions, the result of inflammation. This probability is increased if there is evidence of inflammation about the tube on either side.

There is one other condition that may cause the uterus to be held in its backward position. Sometimes when the fundus lies low in the culdesac, the sacrouterine ligaments produce some constriction above it and prevent its return. This action of the sacrouterine ligaments is increased if the cervix be strongly pulled upon. This is a rare condition and is possible only when the uterus is in the third degree of retrodisplacement.

Complications.—There are several conditions that frequently accompany retrodisplacement and that must be taken into consideration.

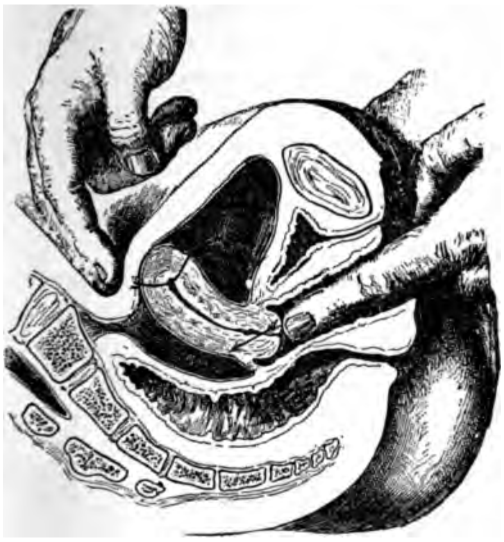


Fig. 547.—Bringing the fundus uteri forward and pushing the cervix backward and upward. (Kelly—*Operative Gynecology*.)

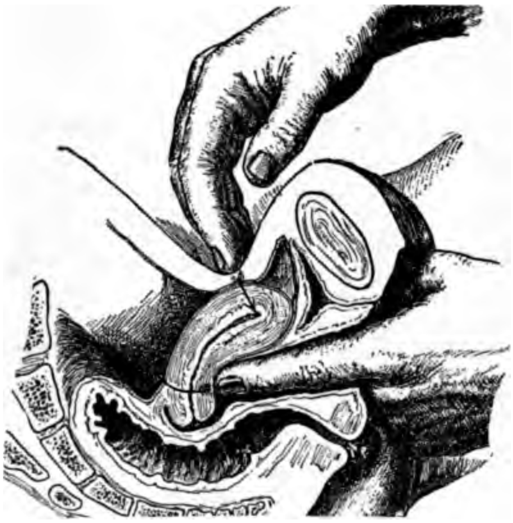


Fig. 548.—The uterus brought forward into position. This shows also the method of taking the backward flexion out of the uterus, by bending it firmly forward over the vaginal fingers. (Kelly—*Operative Gynecology*.)

1. Laceration of pelvic floor.
2. Laceration of cervix.
3. Endometritis.
4. Salpingitis, with or without exudate and adhesions.
5. Tumors, uterine and ovarian.

The last two mentioned may cause trouble in determining the exact location of the body of the uterus. In examining a patient, do not stop when you find one lesion but make a thorough examination and find all the lesions present.

Treatment

If there are no symptoms, no treatment is needed. But the patient should be kept under observation so that if symptoms do develop, effective treatment may at once be instituted before the case has run along and developed complications.

The treatment to be adopted depends on whether the uterus is movable or adherent.

When the Uterus Is Movable

In a case of retrodisplacement with movable uterus, the first step in the treatment is to **replace the uterus** to its proper position. There are two ways of doing this—by bimanual manipulation or by employment of the knee-chest posture.

Bimanual Manipulation.—By the manipulation employed in the bimanual examination, the uterus is often replaced.

If it cannot be replaced by the ordinary bimanual examination methods, then catch and draw down the cervix with a tenaculum forceps (Fig. 544), and raise the fundus as high as possible with the fingers in the vagina. Then press the abdominal hand deeply into the back part of the pelvis, locate the promontory and work along it into the pelvis back of the uterus (Figs. 545, 546). The fundus uteri is then brought forward and at the same time the cervix is carried backward, as shown in Fig. 547. After bringing the fundus forward, bend it well down over the vaginal fingers as shown in Fig. 548, in order to take out any backward flexion that may be present.

To carry out these manipulations successfully, the abdominal walls must be relaxed and the uterus not very tender. If the patient has a thick layer of adipose tissue, the examining fingers sometimes cannot get near enough to the uterine body to manipulate it satisfactorily. If the patient holds the abdominal walls tense, on account of pain or nervousness, the abdominal fingers cannot reach the uterus. If the uterus is inflamed and tender, the pressure necessary to these manipulations causes too much pain.

Knee-chest Posture.—When the uterus, though movable, cannot be replaced by the bimanual manipulations, the knee-chest posture may be used (Figs. 229 to 231). After the patient has been placed in this position (with the clothing about waist thoroughly loosened) the Sims speculum is introduced (Figs. 559, 560). The cervix is then caught with the tenaculum forceps and pulled forward. This brings the fundus uteri out from the promontory and permits it to fall forward into its proper position. The cervix is then pushed well backward into the hollow of the sacrum, and a pessary or packing is put in to hold it there.

The method of replacement by sound or repositor is mentioned only to be condemned. The sound or intrauterine repositor used in this way is dangerous. A uterus that is not adherent can usually be brought forward by one of the two methods already mentioned. A uterus that is adherent could not be brought forward by the sound or repositor, and its use in such a case is liable to lead to inflammation or perforation of the uterus.

In some cases the uterus and adjacent tissues are too tender to permit the manipulations necessary for replacement. In such a case, hot vaginal douches, purgatives and the knee-chest posture morning and evening for a few days, may diminish the tenderness very much. In such a case, after the knee-chest posture has been taken morning and evening for a few days, the uterus may be found forward at the next examination.

Vaginal Tamponade with the patient in the knee-chest posture (Figs. 559, 560) or in the Sims posture, with gauze or cotton, every second or third day, helps to restore the uterus to its normal position. Also, in cases where no pessary is at hand, the uterus, after replacement, may be held in place temporarily by packing the vagina with gauze or cotton in such a way that the cervix is held well back in the pelvis. Again, when a pessary has to be removed temporarily for any cause, the method of holding the uterus by packing may be employed. This method does very well for holding the uterus in position for a short time, but the packing must be changed every two or three days, hence the method is not suitable for long-continued use.

The Pessary.—After the uterus has been replaced, then comes the problem of holding it there. The most convenient and efficient device for this purpose is the pessary. In uncomplicated cases this is often all that is needed.

Varieties of Pessary

Innumerable forms have been recommended, and to attempt to mention all of them would be a waste of time. The following four varieties are the principal ones used at present in the treatment of retrodisplacement, and they are sufficient in practically all cases in which a pessary is the preferable method of treatment.

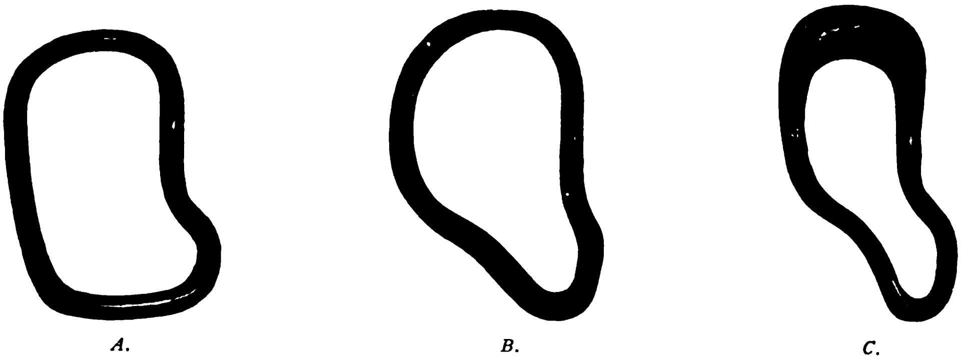


Fig. 549.—*A.* The Hodge pessary. *B.* The Albert Smith pessary. *C.* The Thomas pessary.

1. **Hodge Pessary** (Fig. 549, A). This pessary, devised by Hugh L. Hodge, Professor Diseases of Women in the University of Pennsylvania from 1835 to 1863, may be taken as the type of the hard rubber ring pessaries. It is the original model from which nearly all other pessaries of that character descended. It is still much used and, as explained later, is the most suitable one for certain conditions.

2. **Albert Smith Pessary** (Fig. 549, B).—Albert H. Smith modified the Hodge pessary in two important particulars. He narrowed the anterior end so that it fits well up into the narrow portion of the pubic arch, the point projecting slightly into the arch. This tends to keep the pessary from turning

or slipping about in the vagina and at the same time causes the anterior part of the pessary to lie higher—so that it is out of the way and does not interfere with coitus or with the introduction of a douche nozzle. His other modification was a lengthening of the posterior arm of the pessary. This pushes the posterior vaginal fornix further upward and backward, thus increasing the ability of the pessary to hold the cervix uteri well back in the pelvis.

3. **Thomas Pessary** (Fig. 549, C), sometimes called the Smith-Thomas pessary. T. Gaillard Thomas modified the Smith pessary (which was itself a modification of the Hodge pessary) by thickening the posterior end into a bulbous enlargement. This distributes the pressure over a larger surface of the posterior fornix, and in that way tends to prevent pressure injury of the vaginal vault at that point.

4. **Inflated Ring Pessary,** to be described later (Fig. 576-B).

Action of the Pessary

The action of the Hodge pessary and its modifications, as ordinarily used in a case of retrodisplacement, is to **hold the cervix back** in the hollow of the sacrum (Fig. 550). As long as the cervix is held well back in the pelvis, the fundus uteri will stay forward where it belongs. The pessary folds the cervix uteri back in place by holding back the posterior vaginal vault (to which the cervix is closely attached) and also by pushing upward and backward on the sacrouterine ligaments, thus putting them on the stretch. To accomplish this, the anterior portion of the pessary must have a rather firm support, which it gets from the pubic arch (with intervening soft tissues) and the pelvic floor.

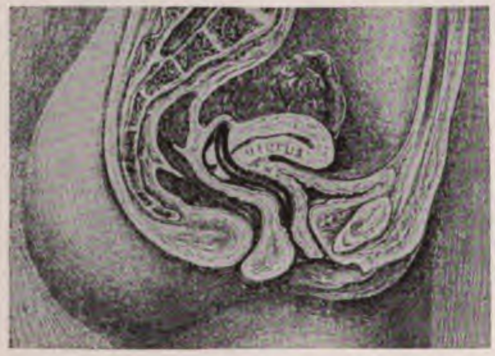


Fig. 550.—The pessary in place. The action of the pessary is to hold the posterior vaginal fornix, and with it the attached cervix, well backward and upward in the pelvis. (Skene—*Diseases of Women.*)

The action of the pessary, with its many curves, seems to be a veritable puzzle to many students and to not a few practitioners, yet it is clear enough when properly approached and studied. In order to make the matter clear to the author's classes in a short explanation, he is accustomed to approach the subject synthetically so to speak, i.e., to gradually build up in mind such a pessary. We know that after a movable retrodisplaced uterus has been replaced, if we keep the cervix well back in the pelvic cavity, that is, a certain distance from the vaginal outlet, the fundus will stay forward (Fig. 550). Suppose, then, that we introduce a straight stick that reaches from the pubic arch to the posterior vaginal vault. Now as long as the anterior end of the stick is supported by the pubic arch, neither the posterior vaginal fornix nor the cervix, which is closely attached to it, can approach the vaginal outlet. The cervix can move up and down through a small arc, but it cannot come any nearer the vaginal outlet and consequently as the cervix is held well back in the pelvis the fundus uteri stays forward.

This is practically the action of the pessary. It takes its fixed **point of support** from the **pubic arch** (the soft tissues intervening), being held up against the narrow part of the arch by the **pelvic floor.** As long as the anterior end of the pessary is properly supported (held stationary) the posterior end holds the posterior vaginal vault and the attached cervix well back in the pelvis. The ring shape of the pessary and the various curves are simply to adjust it comfortably to the adjacent structures. The open ring permits the pessary to lie up well out of the way in the lateral angles of the vaginal canal and also permits the cervix to project through the pessary and the uterine secretions to flow outward without hindrance. The marked upward bend of the posterior portion of the pessary increases its ability to push the posterior vaginal fornix upward and backward and put the sacrouterine ligaments on the stretch. The long upward curve of the front part of the pessary with the narrow anterior end permits the anterior end to lie up out of the way in the narrow part of the arch, and also furnishes a slope against which the perineum and front part of the pelvic floor acts advantageously, helping to support the pessary in both an upward and backward direction and thus taking some of the pressure off the extreme anterior end. If all the pressure on the pessary were transmitted to the very end, it would cause pain by pinching the soft tissues between the pessary and the bony arch. With the long steep upward curve, however, a large part of the downward and forward pressure is borne by the pelvic floor. The little transverse notch or downward dip at the anterior end of the pessary is to prevent pressure on the urethra as the pessary lies well up in the angle of the pubic arch.

The two principal factors in the support of such a pessary are the pubic arch and the pelvic floor. As to just which furnishes the most support, it is hard to say—probably there is much variation in different cases, depending on the conformation of the parts and the shape of the pessary.

When the pelvic floor is severely torn it permits the pessary to sink lower in the pelvis. The anterior narrow end lies at a wide part of the arch, a part too wide to furnish support for it and it slips outside a short distance. This permits the cervix to come forward and then the fundus goes backward. Now in such a case, if we use a pessary with a wider anterior end (e.g., the regular Hodge pessary) it, being wider, impinges on the sides of the arch and holds the cervix back where it belongs. In very severe laceration, the marked relaxation of the pelvic floor allows the pessary to come so low—to such a very wide part of the arch—that not even the Hodge pessary will stay in. In such a case some temporary relief may be given by other styles of pessary to be mentioned later.

Selection of Pessary

The selection of the pessary best adapted to a particular case concerns **the style, size and special modifications.**

As to **style** or form, in retrodisplacement the author prefers the Smith pessary, or Thomas pessary (Fig. 549) in all but exceptional cases. The advantages of this form are:

a. Narrow anterior end that lies well up out of the way. There is little or no interference with coitus or with the introduction of the douche nozzle.

b. Long steep anterior slope on which the pelvic floor can act to advantage in assisting in the support of the pessary.

c. Long posterior arm, which tends to keep the posterior vaginal fornix well up.

d. Thick posterior end of the Thomas pessary, which distributes the pressure over a wide surface of the posterior vaginal fornix and thus prevents injurious pressure or ulceration at any point.

The exceptional cases in which these pessaries are not satisfactory, are as follows:

1. Where there is a severe laceration of the pelvic floor. In these cases a pessary with a wider anterior end is required, as previously explained. Here the regular Hodge pessary is usually the preferable one. In lacerations of extreme severity, where the parts are so relaxed that neither the Hodge nor Smith nor Thomas pessary will stay in, the inflated ring pessary or one of the other forms mentioned under prolapse may give some temporary relief. For permanent relief in such a case operative measures are required.

2. Where the posterior vaginal fornix is too small or shallow to accommodate the large bulbous end the Thomas cannot be used. In such a case the Smith or the Hodge pessary may be used. In each of these the posterior bar is of small diameter and will fit into a small posterior fornix. If the pelvic floor is not too badly torn the Smith pessary is the preferable one of the two, as it has the narrow anterior end and the long posterior arm.

3. When there are painful inflammatory lesions about the uterus or a prolapsed and tender ovary. In some of these cases the pessary may be worn without discomfort after the parts have been held in place by tampons for a few days. In others, the tenderness persists and any form of pessary which pushes well up behind the cervix causes pain and hence cannot be worn. In such cases the inflated ring pessary sometimes gives considerable relief by diminishing the dragging of the heavy uterus on the inflamed adnexa and broad ligaments. As a rule, however, in such cases time spent with pessaries is time wasted, as far as any permanent relief is concerned.

As to the **size** of pessary to be selected, the approximate length may be determined by measuring with the examining fingers the distance from the posterior vaginal vault (pushed well up) to the pubic arch. The length of the pessary should be a trifle less than this. The width of pessary which the vagina will accommodate may be determined approximately by the apparent roominess of the vagina as felt in vaginal palpation. A special maneuver for this purpose is to introduce the two examining fingers to the upper part of the vagina, separate them laterally as far as the vaginal walls will permit and then withdraw them in the anteroposterior diameter (the largest diameter of the vaginal outlet), retaining them as nearly as possible in the original position.

However, the size of pessary that will keep the uterus in position with the least discomfort can be determined certainly only by trial, and several pessaries may have to be worn for a short time before the most satisfactory one for that particular case is settled upon. A pessary that is too small fails to hold the uterus in position and tends to slip out. A pessary that is too large causes pain. It is better to give too small than too large a pessary, as the latter may cause severe pain after it has been in place a day or two, and if the patient is a long way from the physician and cannot succeed in removing the pessary herself, she may experience much suffering.

The **special modifications** refer to slight changes in shape from the regular form, occasionally required to make the pessary more comfortable or more satisfactory in retaining the uterus in position.

1. GENERAL NARROWING of the pessary. The pessaries as purchased maintain a ratio between the width and the length (the longer the pessary the wider it is). As a rule this is desirable. In some cases, however, the vaginal opening is too small to admit a pessary of sufficient length. To overcome this difficulty drop the pessary in hot water for a moment, until it becomes slightly pliable, then remove it with a forceps, grasp it with a towel and squeeze it so as to narrow it laterally to the required extent, and hold it thus until it cools. The cooling may be hastened by holding it in cold water. Do not keep it very long in the hot water or it will become so pliable that it flattens into a simple ring, and all the characteristic curves are lost.

2. LOCAL BENDING.—Occasionally it is desired to bend a hard rubber pessary at some particular point, so as to change an ordinary curve to an unusual one or to change one form of pessary to resemble another form, which is needed but is not on hand. To make these local bendings, coat that part of the pessary to be bent liberally with vaseline or other ointment and hold it high above the flame of an alcohol lamp or Bunsen burner. Hold it close enough to the flame to heat the pessary well at the exact area it is desired to bend but not close enough to burn off the ointment. In a few moments the pessary is softened sufficiently to permit bending. If the pessary is brought too close to the flame, it is burned and the smooth surface roughened.

In 1859, J. Marion Sims introduced the block-tin modification of the Hodge pessary, the advantage of this material being that it is sufficiently pliable to be moulded to any shape and yet firm enough to hold the shape given it. The block-tin pessary was the favorite with T. A. Emmet and was highly recommended by him, but it is not so frequently used at the present time. Ordinarily the hard rubber pessary is preferable.

Pessary Used Only After Replacement

The pessary is ordinarily not used until the uterus has been brought forward. The pessary is not, as many suppose, used to push the fundus uteri forward, neither is it used to prop the fundus forward. The pessary has nothing to do directly with this part of the uterus. All the pessary does is to hold the cervix well back in the pelvis, as previously explained, and then in the ordinary state of affairs the fundus must stay forward.

There are **some exceptions** to the rule that a pessary is used only after replacement. In some cases of roomy pelvis, in which it is difficult to raise a movable fundus uteri because it gets out of reach, a pessary may be used somewhat as an extension to the finger, to help raise the fundus within reach of the abdominal fingers. Hodge, in describing the use of his pessary, mentions it as a lever for replacing the uterus. He directs that the pessary be introduced and then by depressing the anterior end, the posterior end is thrown upward carrying the fundus with it. This is called the lever action of the pessary, the pelvic floor serving as the fulcrum, and he refers to his pessary as the "lever pessary." But this action of this pessary is seldom employed now, as there are more effective methods of replacement.

Again, in a case of movable uterus which cannot be brought forward satisfactorily, if a pessary be introduced and the patient instructed to take the knee-chest posture twice daily, the uterus may be found forward at the next examination a few days later.

Again, in some cases where the uterus can be raised considerably but cannot be brought forward, a pessary introduced and worn just as if the uterus were forward, will, in conjunction with the knee-chest posture morning and evening, give the patient some relief—indicating that in that particular case the symptoms are due not so much to backward displacement *per se* as to the sinking of the uterus with the consequent disturbance of the circulation, which is relieved by the pessary in spite of the fact that the uterus is still in retrodisplacement. It is this holding up of the heavy uterus and the relief of the slight prolapse complicating the retrodisplacement, that accounts for the decided relief often secured by the use of the inflated ring pessary in cases of unreplaced retrodisplaced uterus.

Introduction of the Pessary

Ordinarily the pessary is introduced with the patient in the dorsal posture, immediately after the uterus has been brought forward by bimanual reposition, as already described.

Before introducing a pessary, cleanse it thoroughly in an antiseptic solution and then lubricate it with a suitable ointment. In introducing it into the vaginal opening, if the opening seems rather small, put one finger in the vagina and depress the perineum strongly to make room for the pessary. Remember, in introducing a pessary or speculum or the examining fingers into the vagina, if the opening seems small and more room is desired, the pressure must always be made backward, depressing the perineum. The least pressure forward will pinch the tissues against the pubic arch.

The introduction or placing of the pessary is carried out as follows: Hold the pessary by the anterior end, depress the perineum well with one finger (Fig. 551) and introduce the posterior end with the breadth of the pessary lying in the anteroposterior diameter, which is the largest diameter

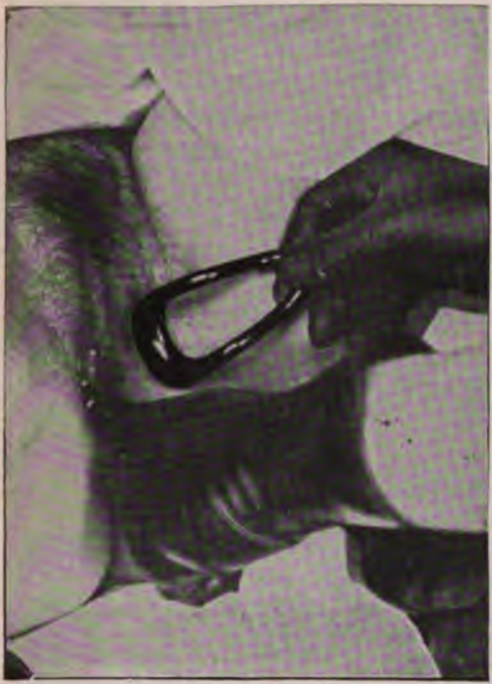


Fig. 551.—Introducing the pessary. First step—depressing the perineum.

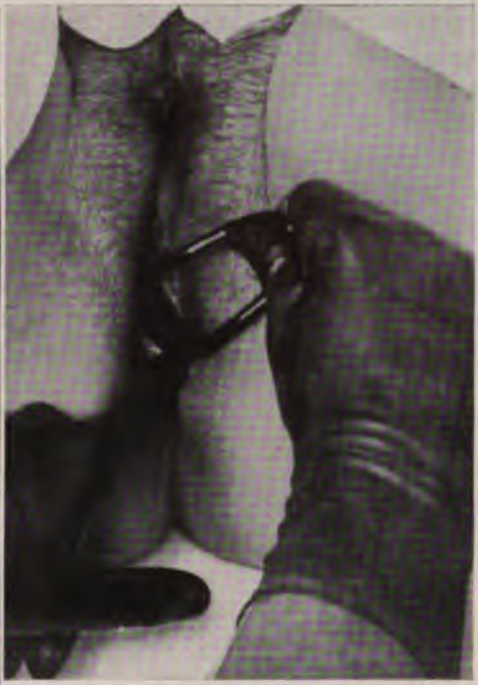


Fig. 552.—Introducing the pessary through the vaginal opening. The width of the pessary lies in the anteroposterior diameter of the opening, which is the long diameter, but is turned somewhat obliquely to avoid the urethra.

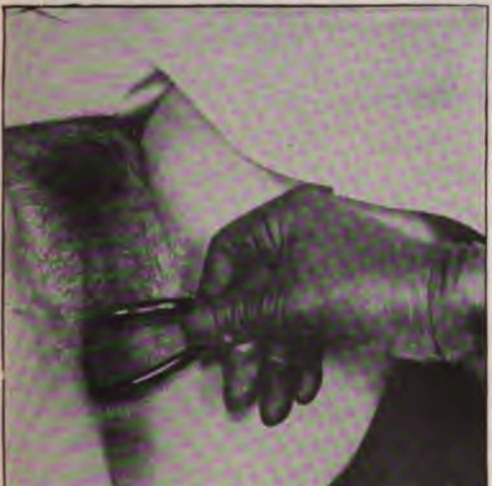


Fig. 553.—Introducing the pessary. The pessary is now well within the vagina and ready for turning.

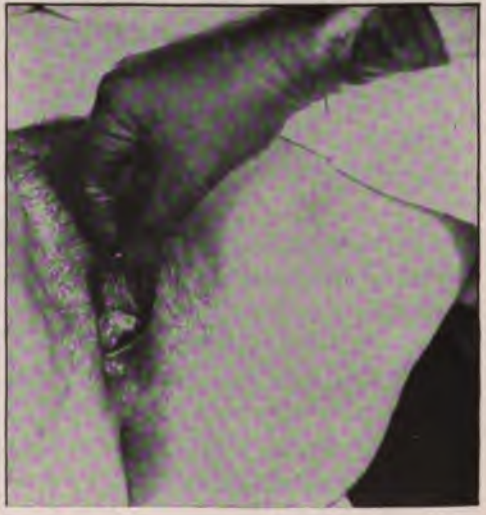


Fig. 554.—Introducing the pessary. The pessary is turned so the width lies transversely, for the transverse diameter is the long diameter of the vaginal canal, though not of the vaginal entrance. The pessary is then pushed in until its further progress is stopped by the cervix.

of the opening. The pessary should be held somewhat obliquely so as not to make painful pressure on the urethra (Fig. 552). When the pessary is about half way in (Fig. 553) turn it so that the breadth of the pessary lies laterally (Fig. 554) and the posterior arm is directed upward. Then push the pessary along until it will not go any further. It stops because the posterior end is against the anterior lip of the cervix. Then introduce a finger into the vagina beneath the pessary, catch the posterior bar with the finger tip (Fig. 555), depress it (Fig. 556) and then push the pessary past the cervix. Fig. 550 shows the pessary in place.

After the pessary is in place it is well to have the patient walk about the room a little, to see whether there is any discomfort. If there is any decided pain or marked discomfort, try a smaller size or another form.

In those cases in which it is necessary to use the knee-chest posture to effect reposition and also in those cases in which it is thought advisable to use a pessary even though the uterus cannot be brought well forward, it is advisable to introduce the pessary with the patient in the knee-chest posture.

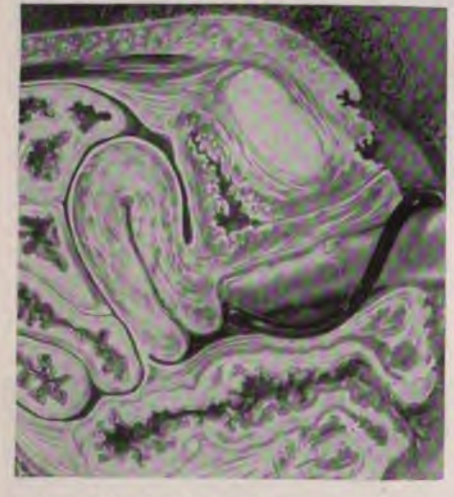


Fig. 555.—Introducing the pessary. The index finger is passed to the top of the posterior end, which is then depressed until it can be pushed past the cervix, as shown in Fig. 556.

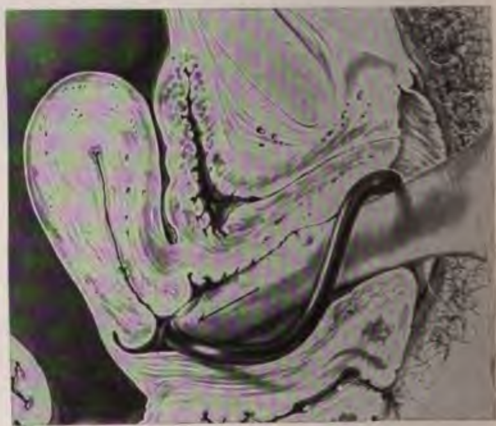


Fig. 556.—Introducing the pessary. The posterior end depressed and being pushed past the cervix. The pessary is shown in place in Fig. 550.

Instructions to Patient with Pessary

The care of a patient having a pessary in place, includes the following points:

Visits to the Physician.—When the pessary is introduced the patient is directed to return in about three days. If the pessary is proving satisfactory then, she need not return again for a week. If everything is going well at this third visit, she need not return except once every four to six weeks to have the pessary removed and thoroughly cleansed and replaced.

There is more or less uncertainty for the first week or so, as to just how the pelvic structures will accommodate themselves to a pessary. For that reason it is well to instruct the patient to return at once if any unusual pain is felt or if the pessary appears to slip out of position. But the patient should return in three or four days, even though she has no particular disturbance, for the uterus may have settled back into its old malposition.

At this second visit, inquire whether the patient has noticed any protrusion or slipping of the pessary or has had any pain or discomfort from the pessary. A pessary which is entirely satisfactory should give little or no sensation of its presence, in fact, in most cases the patient would not know the pessary was there if she were not told. Inquire also how much she has been relieved from the previous discomfort, for which the pessary was introduced. Ascertain by examination whether the pessary is in proper position and whether it holds the uterus in proper position. If so, do not disturb the pessary but direct the patient to return in a week. If the uterus is out of position, remove the pessary, replace the uterus, and introduce another pessary, better adapted to the case, and again direct the patient to return in three days, when another examination is to be made.

When the pessary is found satisfactory at the second and third visits, it is to be assumed that it will prove satisfactory right along, and as long as the patient feels well she need not return, except every month or six weeks as above indicated. This return at regular intervals of a few weeks is important in every case (though, exceptionally, the intervals may be longer) for three reasons—(a) because the pessary is liable to accumulate concretions that may prove irritating, (b) because long-continued pressure may produce ulceration at some point in the posterior vaginal fornix and (c) because it is important to know whether the pessary is doing the work it is used for, and whether everything is going as it should. Injurious pressure on the wall is indicated by a distinct groove or ridge with infiltration in the affected area. When such is present, the pessary should be left out for a few weeks or a different form used. If necessary to leave the pessary out for a time and trouble is experienced from the uterus returning to its malposition, packing in the knee-chest posture or in the Sims posture may be employed during this interval. In many cases, however, a resort to the knee-chest posture night and morning is all that is necessary.

Douches.—The patient wearing a pessary should take a vaginal douche every day or every few days. If the discharge is very free it may be advisable to take two or three douches daily. If there is practically no discharge two douches weekly may be sufficient. Ordinarily the patient is directed to take a douche once daily or every other day. The kind of douche to be taken varies with the conditions present—a large hot douche or an astringent douche when the indications previously given for them are present. When there are no special indications, prescribe the bichloride douche or the aluminum acetate douche.

Knee-chest Posture.—The knee-chest posture (Figs. 229 to 231) taken by the patient night and morning, is very useful in those cases in which the uterus tends to return to its old position or in which the patient complains of downward pressure in the pelvis. It causes the patient some inconvenience and is not necessary when the pessary holds the uterus well up and entirely relieves the symptoms. But in many cases of damaged pelvic floor, its use along with the pessary is very advantageous.

The **activity of the patient** need not be curtailed on account of the pessary. The pessary is meant to hold the uterus in proper position and restore the patient to comparative health, so that she can pursue her usual activities without disturbance. If the patient cannot pursue her usual activities, after the pessary has been worn a month or two, the pessary has failed of its purpose, and some more effective method of treatment is indicated.

As to **coitus,** the fact that a pessary is being worn is no bar to sexual intercourse. With the Thomas pessary and the Smith pessary, the anterior end lies so high in that it interferes but little, if at all. Even with the Hodge pessary, coitus may, in some cases, be accomplished with but little inconvenience. Coitus, however, causes marked pelvic congestion and this increases the liability of discomfort resulting from the pressure of the pessary. Consequently for the first few weeks, while the pessary is on trial so to speak, coitus had best be discontinued. Later, after the uterus has been some time in its proper position and the pelvic structures are adjusted to the pessary, no restriction in this direction is necessary ordinarily.

In some cases, the replacement of the uterus and wearing of the pessary is carried out principally to increase the chance of pregnancy, and in such cases coitus is permissible from the first. It is well to mention this fact to the patient or her husband, as otherwise it may be thought that coitus is not possible while the pessary is in place.

If pregnancy should develop, the pessary should be worn just the same until the uterus has become large enough to prevent its sinking back into the pelvis. The douche should then be taken only warm—not hot, for a hot douche may excite uterine contractions and lead to miscarriage. Usually along in the third or fourth month the pessary is taken out, as it is of no further use and if left in longer it might cause irritation and disturbance.

Occasionally a pessary excites pain shortly after pregnancy takes place. If so, it should be removed, the patient being directed to take the knee-chest posture two or three times daily, to keep the fundus uteri forward. Tampons or tamponade of the vagina to keep the uterus forward is not advisable in these cases, as it might lead to miscarriage.

When to Discard the Pessary

The time at which the pessary may be discarded varies much in different cases, and in each case is more or less a matter of trial. A very good rule is to leave out the pessary after the uterus has remained in position continuously for three or four months. Direct the patient to return in two or three days. If the uterus has returned to its old backward position, replace it and use the pessary again for several months.

If the uterus maintains its forward position without the pessary, direct the patient to return again in two weeks. If then the uterus is in proper position and the patient feeling well she may be discharged, being directed to return if symptoms should at any time reappear.

In some cases the pessary may be permanently discontinued in three or four months, but in more cases it must be worn for six months or a year, while in certain cases, it must be worn a still longer time or even indefinitely.

If after the pessary is removed, the uterus shows a tendency to go backward, it is well to have the patient take the knee-chest posture occasionally for some months.

The Inflated Ring Pessary

The action of the inflated ring pessary (Fig. 576, B) is principally to raise the uterus and adjacent tissues somewhat and to support them. It has no particular action in holding the cervix well back in the pelvis nor in maintaining the uterus in a proper forward position. Consequently the field of usefulness of this particular form of pessary is in those cases in which the uterus cannot be got into the forward position or cannot be maintained there. The simple supporting of the uterus, thus overcoming the slight prolapse which is present in most cases of retrodisplacement, often gives the patient much relief, though the retrodisplacement has not been corrected.

The effect just noted of the simple support of the uterus, serves to show the importance of the slight PROLAPSE in these cases and serves to show also that the retrodisplacement, as a factor in the causation of the symptoms and as a factor to be considered in the treatment, is not of such exclusive importance as one would infer from the usual teachings on this subject. The relief that follows operative replacement and permanent correction of the retrodisplacement, is due to a large extent to the simultaneous elevation of the uterus and adnexa.

On the other hand, such a pessary is sometimes used by the physician or by the patient on her own responsibility (this form of pessary being frequently advertised to the laity), in cases where complete replacement could be easily accomplished. In such a case, complete replacement with the subsequent use of the Thomas or Hodge pessary would tend to effect a cure, while the effect of the inflated ring pessary is imperfect and only temporary.

In the cases in which the inflated ring pessary is useful, some radical measures are usually preferable and the pessary is simply a temporary expedient to make the patient more comfortable while she is getting ready for operation. Some patients, however, prefer to wear the pessary indefinitely, even though it affords only partial relief, rather than submit to any operative measure.

This pessary requires a douche every day and should be removed and cleansed at least every week. It requires more care to prevent incrustation and irritation. The patient can usually remove and reintroduce the pessary satisfactorily herself after a little practice. Just before introducing it, the patient should take the knee-chest posture for a few minutes. Then lying on her back or side she introduces the pessary, which has been previously cleansed and lubricated. When coitus is desired, the pessary may be taken out in the evening and left out until morning. If desired a loop of strong string may be attached to the pessary to facilitate its removal. If the pessary becomes deflated, it may be reinflated with a hypodermic syringe, the needle being introduced through the thick spot designed for that purpose.

A pessary of about this form is made of hard rubber (Fig. 576, C) and is used in the same way. It does not become deflated and is less likely to accumulate incrustation and irritate the vaginal wall. It is unyielding, however, and for that reason is more likely to produce painful pressure at some point. Also a smaller size must be used, for this pessary cannot be compressed, as the inflated rubber pessary can, to pass the vaginal orifice.

5. **Flexible Ring Pessary.**—The flexible-rubber ring (Fig. 576, A) is sometimes preferable to the inflated ring, particularly in cases where there is very free discharge. The opening being larger, the free discharge escapes easier and consequently there is less retention and irritation.

In a considerable proportion of cases in which the uterus is movable, the pessary is not satisfactory, for one of the following reasons:

Laceration of the pelvic floor.
Prolapsed and tender ovary or tube.
Nervousness.

In the first class of cases, the pessary fails to keep the uterus in position. The weakening of the pelvic floor permits the anterior end of the pessary to sink below its point of support. It sinks down to a wider part of the pubic arch and then slips out of the vaginal opening. The cervix uteri then sinks forward and the fundus goes backward.

When an ovary has prolapsed into the posterior culdesac the pessary presses on it and causes pain. The same thing happens if an enlarged and tender tube drops into this situation, or if there is an inflammatory exudate there. In either case, the pessary causes so much pain that it cannot be worn.

There is occasionally a case in which, though the pessary holds the uterus in position and causes no particular pain, it makes the patient uncomfortable and nervous to such an extent that its use is not satisfactory.

In all such cases other measures for holding the uterus in position must be employed.

Operative Treatment.—When there are troublesome symptoms that are not relieved by the measures previously mentioned, operative treatment is required. The various classes of operative measures are mentioned further along.

In order that the operative treatment may prove satisfactory, the patient should be put through a most careful and thorough pelvic examination, that the exact cause of the persistence of the displacement may be accurately determined, and the form of operative treatment selected accordingly.

In a large proportion of the patients who have borne children, there will be found a relaxed condition of the pelvic floor and of the broad ligaments and sacro-uterine ligaments. It is evident that in such a case, the simple bringing of the fundus uteri forward and fastening it there is only a small part of the necessary work. The pelvic floor must be strengthened, and some means must be used also to lift up the uterus and thus overcome the prolapse due to the relaxation of all the supports of the organ. In many of these cases the uterus is large and heavy from subinvolution and is the seat of chronic endometritis.

When the Uterus Is Adherent

When the fundus uteri cannot be brought forward by the methods previously described and no tumor that is responsible for the fixation can be felt, it is assumed that the uterus is "adherent," i.e., held in its abnormal position by the products of pelvic inflammation, affecting the tube or the peritoneum or the connective tissue. The fixation may be so close that the fundus cannot be moved appreciably, or it may, on the other hand, permit considerable movement in various directions, but not enough to allow the fundus uteri to be brought entirely forward.

For the purposes of treatment it is convenient to divide these cases of adherent retrodisplacement into two classes—(1) those in which the inflammation is acute or subacute, and (2) those in which it is chronic or has practically disappeared, leaving only the sequelae.

Inflammation Acute.—These cases present, in addition to the retrodisplacement of the uterus, the usual symptoms and signs of acute or subacute pelvic inflammation. The symptoms presented by the patient are due principally to the inflammation, and the treatment is at first directed wholly to that. The general and special measures for acute pelvic inflammation (see Chapter X) are used and continued for several weeks, until all acute symptoms have disappeared.

No operation or other direct disturbance of the tissues for the purpose of bringing the uterus forward is indicated in this acute stage. All operative measures are to be postponed, except so far as such measures may be indicated directly by the inflammation. The patient is treated for the pelvic inflammation the same as though she had no retrodisplacement.

When the inflammation subsides, the troublesome symptoms may disappear to such an extent that no treatment for the retrodisplacement is required. It is the relief of pain and discomfort that the patient seeks and when this can be secured simply by the relief of the inflammatory trouble, it is not necessary to disturb the uterus. In fact, as a rule, anything in that direction short of removal of the inflammatory focus, will tend to stir up again the troublesome symptoms.

Most of these patients require operative treatment later, but occasionally there is a patient who continues to feel perfectly well after she recovers from the attack of pelvic inflammation—she can work hard, goes as much as she pleases, and she is symptomatically a well woman. It has been the author's experience that this permanent or long-continued freedom from troublesome symptoms without satisfactory replacement of the uterus, occurs more frequently in the cases of retrodisplacement with a fixed uterus than in those with a movable uterus, though it is not very frequent in either. The fixation prevents the constant downward dragging (beginning prolapse) which produces a large part of the distress in the ordinary cases of large heavy retrodisplaced mobile uteri.

Operation is required, however, in a majority of these cases sooner or later, either because of a persisting focus of inflammation, with chronic invalidism, or because of the sinking and dragging of the heavy retrodisplaced uterus on the damaged and sensitive adnexa or adjacent structures. In the case of a partially movable uterus, the wearing of a pessary (for example, the inflated ring pessary) that holds the heavy uterus up some, will sometimes give considerable relief. Such a pessary prevents the constant dragging of the uterus on its supports and on the sensitive adnexa, and in that way gives relief, though there is no correction of the retrodisplacement.

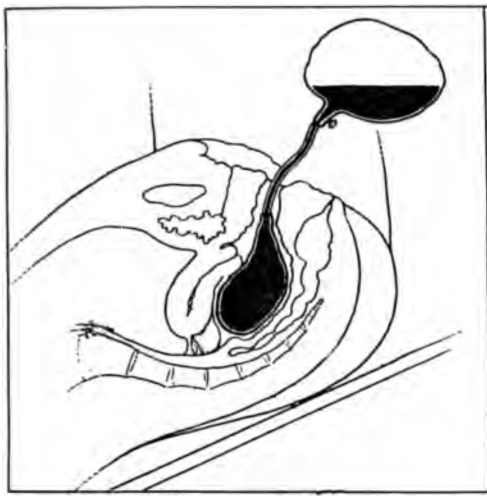


Fig. 557.

Fig. 557.- Mercury pressure treatment, for stretching adhesions or hastening the absorption of a chronic exudate. The mercury in the outside bag is allowed to flow gradually into the vaginal bag until the desired pressure is secured.

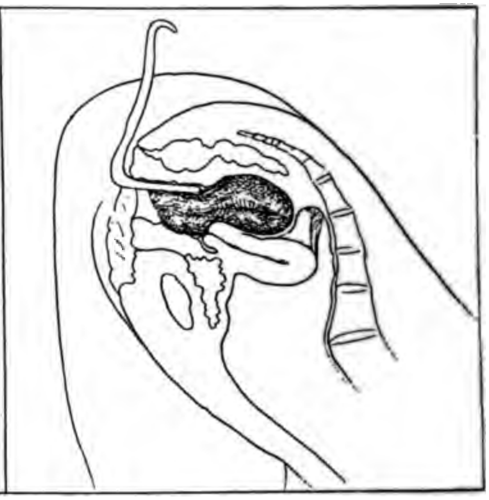


Fig. 558.

Fig. 558.--Vaginal packing in the knee-chest posture. This may be used to aid in holding what has been gained by stretching light adhesions, manually or otherwise.

Chronic Inflammation.—In the chronic cases, fixation of the retrodisplaced uterus is usually due to inflammation beginning in a fallopian tube, consequently it is frequently accompanied by salpingitis and an inflammatory exudate involving one or both tubal regions. There may be a collection of pus in a tube or in the mass of exudate about the tube, or there may be only a mass of inflammatory exudate without pus, or there may be only adhesions. If the previous inflammation was in the connective tissue, there will be infiltration remaining from the pelvic cellulitis (parametritis). In either case, the uterus is found in an abnormal position and cannot be replaced by the methods previously described.

In these cases, considerable relief may be given by measures that tend to allay the accompanying pelvic inflammation and that stretch the adhesions and that support the uterus to some extent. The palliative measures mentioned under chronic pelvic inflammation (see Chapter X) may be employed.

For stretching the adhesions and infiltrated tissues, in an endeavor to restore the uterus to its normal position, **pelvic massage** may be useful (see Gynecologic Treatment, Chapter III).

Pressure treatment with mercury is another method sometimes useful in stretching adhesions. The effects sought by pressure treatment are (a) to hasten the absorption of a chronic exudate in the pelvis, (b) to assist in stretching adhesions or infiltrated tissues and (c) to assist in raising a displaced uterus. The articles required are (a) two strong colpeurynters connected by a stopcock, (b) two pounds of mercury, (c) bag of fine shot weighing three pounds, with an elastic bandage for fastening same to the lower abdomen. The empty colpeurynter is introduced into the vagina, the patient's hips elevated, the shot-bag applied to the lower abdomen, and the mercury

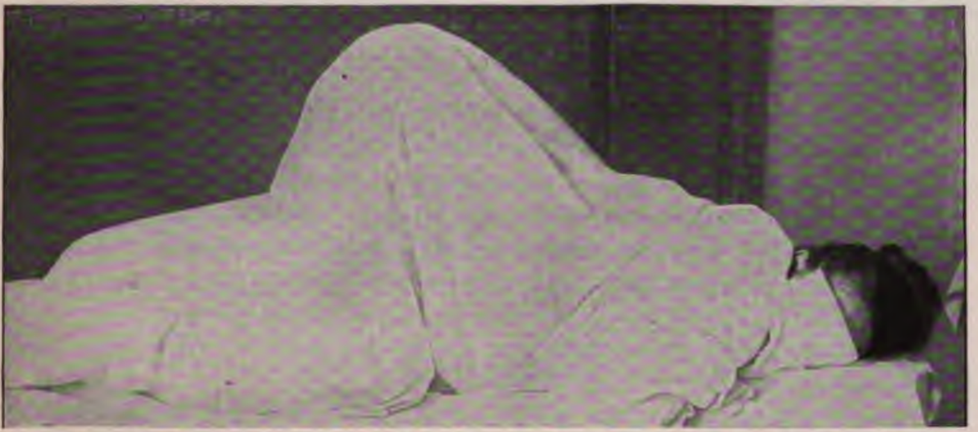


Fig. 559.—The knee-chest posture. All constriction about the waist must be removed. The thighs should be perpendicular and the breasts should be brought down against the table (see Figs. 229 and 231).

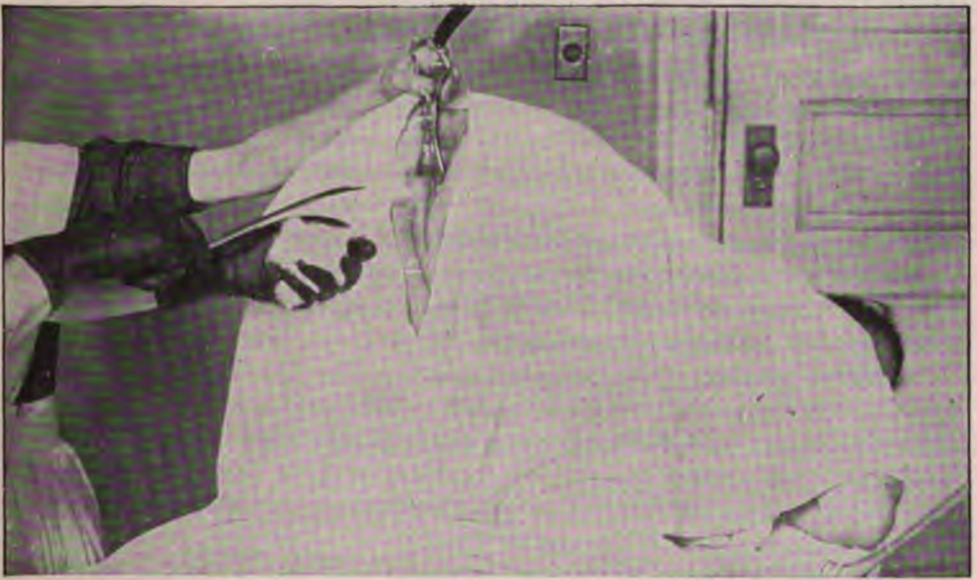


Fig. 560.—The knee-chest posture, with the patient draped and ready for packing or other treatment.

run into the vaginal colpeurynter in sufficient quantity to make the desired pressure.

The bladder and rectum must be empty. With the patient in the dorsal posture on a bed or table, one colpeurynter (detached from the other and empty) is cleansed, lubricated, folded, grasped with a uterine dressing forceps and introduced to that portion of the vaginal vault nearest the exudate. The patient then takes the position to be maintained during the treatment—on her back, if the exudate is behind the uterus, or on the side corresponding to the exudate if it is on one side of the uterus—and the shot-bag is placed on the lower abdomen and so fastened by a bandage or elastic belt that it will maintain the counterpressure in the direction of the exudate when the patient's hips are elevated. The hips are then elevated. The other colpeurynter, containing the two pounds of mercury, is connected with the colpeurynter tube extending out of the vagina and the stopcock is opened sufficiently to permit a small stream of mercury to flow into the vaginal colpeurynter at the vaginal vault (Fig. 557). From one to two pounds of mercury is allowed to flow into the vaginal colpeurynter, depending on the absence of pain. There should not be enough pressure to cause much pain.

The treatments are given daily and at first should not last more than half an hour, to be soon increased to one hour. Later, if well borne, the treatment may be kept up for several hours at a time—in fact, may be continued the greater part of the day with intervals of rest.

Pressure treatment is applicable principally in cases of adherent retrodisplacement of the uterus and in cases of chronic pelvic inflammation in which the exudate is in the culdesac of Douglas or in the broad ligament or in which there are adhesions low in the pelvis. When the exudate is situated high, above the fundus uteri or about the tubes, this treatment is not satisfactory. When severe pain is caused by the pressure, the treatment must be discontinued, as there is danger of starting up active inflammation or disseminating an unrecognized focus of active infection. It is contraindicated also in the presence of acute inflammation, a collection of pus, active salpingitis, pelvic tuberculosis, malignant disease, or pregnancy.

Vaginal packing in the knee-chest posture (Fig. 558 to 560) is sometimes useful in helping to hold what is gained by pelvic massage or mercury pressure treatment. Cases with slight adhesions, and especially cases in which the uterus is held in its abnormal position by the sequelae of a pelvic cellulitis only, may be benefited thereby, and in such cases these measures may be given a thorough trial. But in the majority of cases of fixed retrodisplacement, the inflammatory lesions are of such character that this attempted stretching can do no good and may do much harm. The proportion of cases in which permanent relief of the pelvic distress can be secured, in this way, is very small. At least, such has been the observation of the author who has studied this class of cases month after month and year after year. And he has endeavored to find for each variety, the treatment that would give the required relief with the least danger to the patient and the least sacrifice of tissue.

In the SEQUELAE OF CELLULITIS, without associated peritoneal involvement, one may expect softening and stretching of infiltrated tissue, increased mobility of the uterus, improvement of the intrapelvic circulation (lymph and blood), relief of distressing symptoms, and in some cases a complete restoration of the uterus to its normal position.

When there is a peritoneal or TUBAL INVOLVEMENT, as evidenced by a history of attacks of pelvic peritonitis and by induration in one or both tubal regions, little can be expected from stretching or kneading of the affected tissues. Even though all acute inflammation has apparently long since disappeared, these tubal and peritubal and periovarian lesions are usually aggravated rather than improved by massage or pressure treatment. As previously explained, there is present in nearly all these cases a focus of active irritation in the tubes. Nature may take care of this and, if assisted by rest and general measures, may limit it so that it causes little trouble or may eradicate it entirely, but pelvic massage and pressure treatment are likely to interfere with this natural cure instead of aiding it, except as to hastening the absorption of outlying masses of exudate.

Operative Treatment is indicated in practically all cases of fixed retrodisplacement, except in those in which the fixation is due wholly to the sequelae of pelvic cellulitis or scar-tissue about the vaginal vault. Of course, operation is required only in those cases in which troublesome symptoms persist in spite of treatment for the pelvic inflammation.

The objects of the operative treatment are two, first the removal of products of inflammation and of damaged organs as far as necessary and, second, the lifting and bringing forward of the body of the uterus and fastening it.

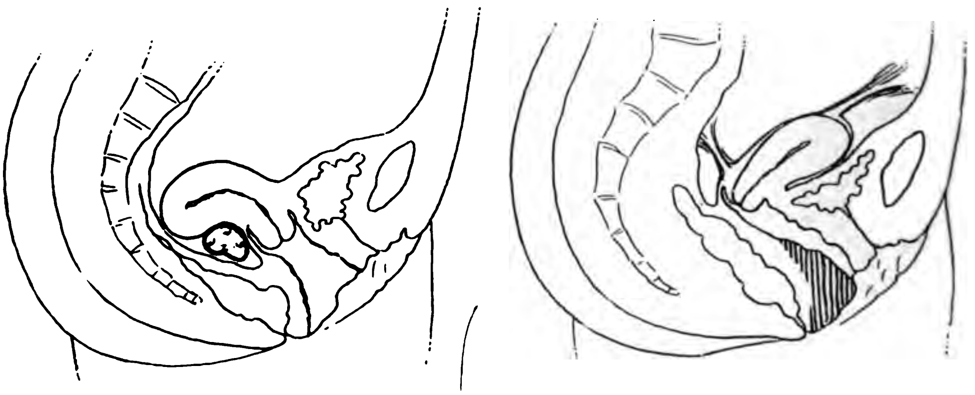
These objects may be accomplished by either vaginal section or abdominal section. There are certain cases in which vaginal section is the preferable method of approach and there are other cases in which abdominal section is clearly indicated. Between these special cases at each extreme there is a large middle class of the chronic cases in which the work may be satisfactorily accomplished by either route. Some operators prefer one and some the other route. In the author's opinion in the majority of these cases abdominal section is preferable. It gives a much better chance for an accurate determination of what structures should be removed and what should be left. It gives a better chance also for complete and accurate removal of diseased structures without injury to tissues that are left. Furthermore, it permits the fastening of the uterus well forward in such a way that it and its adnexa are satisfactorily *elevated* as well as brought forward.

The portion of the operative work dealing with the inflammatory trouble will be mentioned under chronic pelvic inflammation (Chapter X). The operative measures for the correction of the displacement, after the inflammatory trouble has been taken care of, are mentioned below:

Operative Measures

The operative measures required in patients with retrodisplacement of the uterus may be divided into three groups—(a) measures for reducing the inflammation and enlargement of the uterus and for restoring the pelvic floor, (b) measures for relieving or removing the pelvic inflammation, and (c) measures for bringing the uterus and adnexa forward and upward and fastening them there. The measures of the first and second classes are given elsewhere, under the respective diseases.

The principles of operative treatment for retrodisplacement of the uterus are illustrated in Fig. 561. The operative measures for holding the uterus forward are very numerous, the number running well above a hundred. There are, however, certain representative operations that may be mentioned in order to give an idea of the various methods of approach and the various structures utilized. The methods of approach are (A) through the inguinal canals, (B) through a median abdominal incision, and (C) through the vagina.



A. *B.*

Fig. 561.—The principles of operative treatment for uterine retrodisplacement. *A*, The condition to be corrected. The corpus uteri is retrodisplaced, the adnexa is prolapsed under it and the pelvic floor is relaxed. *B*, The corrections made. The uterosacral ligaments have been shortened, the round ligaments have been shortened, the prolapsed adnexa have been fastened up, and the pelvic floor has been repaired.

A. Through the Inguinal Canals.

1. Extraperitoneal Shortening of the Round Ligaments (Alexander-Adams Operation). An incision is made over the inguinal canal on each side and the round ligament is isolated and drawn out sufficiently to take up the slack and bring the uterus forward. The ligaments are then fastened in the canals by sutures. The peritoneal cavity is not opened.
    - **a.** Operation is entirely extraperitoneal.
    - **b.** Utilizes the strong proximal portion of the round ligaments for supporting the uterus.
    - **c.** Does not permit the breaking up of adhesions.
    - **d.** Does not permit direct exploration of the pelvis, to ascertain abnormal conditions or to make certain that the uterus comes satisfactorily forward without complications.

- e. Ligaments pull laterally instead of forward and hence permit return of displacement when there is much backward tendency.

2. INGUINAL CELIOTOMY WITH SHORTENING OF ROUND LIGAMENTS (Goldspon operation). This is practically the same as the Alexander operation, except that the peritoneal cavity is opened on one or both sides.
    - a. Utilizes the strong proximal portion of the ligaments for supporting the uterus.
    - b. Permits partial exploration of the pelvic cavity and the breaking of light adhesions.
    - c. Ligaments pull laterally instead of forward.
    - d. Has the disadvantage of median abdominal section (peritoneal cavity opened) without the advantages (through exploration, safe removal of diseased structure, forward pull of new ligaments).

B. **Through Median Abdominal Section.**—Pertaining to all the operations in this class are the advantages of thorough exploration of the pelvis and lower abdomen and the safe removal of diseased structures, including the appendix when necessary. The special advantages and disadvantages of each submethod are indicated below.

1. FASTENING THE FUNDUS UTERI DIRECTLY TO THE ABDOMINAL WALL.
    - I. VENTROFIXATION. The fundus uteri is scarified and sutured directly (without intervening peritoneum) to the subperitoneal aponeurotic structure of the abdominal wall.
        - a. The uterus is fastened very firmly forward, so that there is hardly a possibility of return of the displacement.
        - b. Causes serious interference with the development of the uterus in pregnancy, hence is not permissible ordinarily in the child-bearing period.
    - II. VENTROSUSPENSION.—The fundus uteri is fastened by small silk sutures to the peritoneum of the abdominal wall. The idea is to secure the formation of a band of tissue which will hold the fundus forward (suspend it from the wall) but will not interfere with the development of the uterus in pregnancy. (Some prefer to pass the suspension sutures through the utero-ovarian ligaments rather than directly through the uterine tissue).
        - a. Direct forward pull, holding the uterus well forward.
        - b. Does not interfere with the development of uterus in pregnancy.
        - c. Uncertainty of ultimate result. The suspending band may become so stretched that it permits return of the displacement or, on the other hand, an unusual amount of scar-tissue may form causing a firm fixation of the

uterus to the abdominal wall, which would seriously interfere with the pregnancy.

d. There is a free band in the abdominal cavity, occasionally leading to intestinal obstruction.

2. INTRAABDOMINAL SHORTENING OF ROUND LIGAMENTS.

- I. Folding of the round ligaments in various ways.
    - **a.** No interference with pregnancy, as the round ligaments enlarge with pregnancy and undergo involution afterward.
    - **b.** No free band in abdominal cavity.
    - **c.** The strain comes on the weak part of the ligament near the inguinal ring. This is likely to stretch and permit return of the displacement.
- II. Drawing the round ligaments through a hole in the broad ligament of each side and fastening them together back of the uterus.
    - **a.** Secures excellent elevation of the uterus and adnexa.
    - **b.** The strain falls on the weak portion (distal portion) of round ligaments.
- III. Suturing middle of round ligaments to the peritoneum of the anterior abdominal wall.
    - **a.** Peritoneal adhesions stretch in time and are likely to permit return of the displacement.

3. TRANSPLANTATION OF ROUND LIGAMENTS INTO THE ABDOMINAL WALL.

The intraabdominal portion of each ligament is drawn into the musculo-aponeurotic layer of the abdominal wall and fastened in the median incision (the median incision may be longitudinal or transverse). The shortened ligament leaves the abdominal cavity at different points in the different classes of operations, as follows:

- I. Out through the aponeurotic wall at the internal inguinal ring, and then to the median incision (Sandberg, Peterson, Montgomery, Barrett and others).
    - **a.** Utilizes the strong portion (proximal portion) of ligaments for supporting the uterus.
    - **b.** No free band in peritoneal cavity.
    - **c.** Direction of pull on uterus is lateral instead of forward, hence the displacement is likely to return if there is much backward tendency.
- II. Out directly through the rectus muscle (Gilliam operation).
    - **a.** Utilizes the strong proximal portion of the ligaments.
    - **b.** Direction of pull is directly forward, hence holds uterus and adnexa well forward and upward, against even strong backward tendency.

- **c.** Can be used even when the round ligaments are fixed by inflammatory infiltration or are too weak to be used for extensive implantation.
- **d.** Gives two free bands in the peritoneal cavity, which may cause intestinal obstruction.

III. Out directly through the rectus muscle, with the addition of a suture in each side to unite the distal portion of the round ligament to the anterior abdominal wall and thus close the opening through which an intestinal coil might slip (Gilliam-Ferguson operation).

- **a.** Utilizes the strong portion of the ligaments.
- **b.** Direction of pull is directly forward.
- **c.** Can be used even with fixation of the round ligaments or serious attenuation of the same.
- **d.** No free band in peritoneal cavity.
- **e.** Operative manipulations more complicated and time-consuming than necessary, where the round ligaments are in good condition.

IV. Out through the peritoneum near the internal inguinal ring, then along in the subperitoneal tissue and out through the rectus muscle (Gilliam-Crossen operation). The details of this are explained later (Figs. 590, 591, 592).

- **a.** Utilizes the strong portion of the ligaments.
- **b.** Direction of pull is forward. It is not so directly forward as in the regular Gilliam operation, but sufficiently so to answer the purpose in practically all cases.
- **c.** No free band in peritoneal cavity.
- **d.** Operative manipulations are few and quickly executed.
- **e.** Not applicable in cases of fixation of round ligaments nor when the ligaments are seriously attenuated.

4. REEFING THE BROAD LIGAMENTS.

- **a.** This lifts the uterus and adnexa.
- **b.** Does not hold fundus uteri well forward.

5. SHORTENING OF SACROUTERINE LIGAMENTS (through the abdominal incision).

- **a.** Draws the cervix uteri well back and upward in the pelvis, which is an important consideration in cases in which the cervix comes far forward.
- **b.** When used alone it does not satisfactorily elevate and hold forward the fundus uteri and adnexa. It is used when necessary in combination with some anterior operation for holding the fundus forward.

C. **Through the Vagina.**—The vaginal operations in general have the advantage that they are easily combined with the vaginal work previously mentioned as necessary in a considerable proportion of the cases of retrodisplacement. Again, there is less handling of peritoneal surfaces and, consequently, less shock and less danger of peritonitis.

On the other hand, they have the disadvantage that they do not provide for satisfactory elevation of the fundus uteri and adnexa nor for the decided pull forward and upward that is necessary when there is a strong backward tendency. Again, pathologic conditions in the pelvis or lower abdomen cannot be so well determined nor so safely and accurately treated.

1. VAGINOFIXATION.—The peritoneal cavity is opened by anterior vaginal section and the fundus uteri fastened forward by sutures passing through the vaginal wall and the anterior surface of the uterus.
    - **a.** Fixes the fundus uteri well forward and throws the cervix backward.
    - **b.** Does not provide for satisfactory elevation of the uterus and adnexa.
    - **c.** Uncertainty of ultimate result. As formerly carried out it caused serious trouble in pregnancy. Improvements in the technic have lessened this danger, but have not eliminated it entirely.

      When the uterus is fastened forward securely enough to insure its staying there, an excessive amount of scar may form and cause trouble in pregnancy. On the other hand, when the operation is so conducted as to practically eliminate this danger, the fixation is likely to be insecure and there may be return of the displacement.
2. VESICOFIXATION.—The peritoneal cavity is opened by anterior vaginal section and the fundus uteri is brought forward and sutured to the vesical peritoneum.
    - **a.** Fundus brought well forward.
    - **b.** Does not provide for satisfactory elevation of the uterus and adnexa.
    - **c.** The peritoneal adhesions are likely to stretch and permit return of the displacement.
3. SHORTENING THE ROUND LIGAMENTS THROUGH VAGINAL INCISION, by folding them in various ways.
    - **a.** Brings fundus uteri forward.
    - **b.** Does not provide for satisfactory elevation of uterus and adnexa.
    - **c.** Uterus is suspended by the weak portion (distal portion) of the ligaments.
    - **d.** Direction of pull is lateral instead of forward.
4. ANTERIOR COAPTATION OF THE BROAD LIGAMENTS.—The bladder is separated from the uterus, as in anterior vaginal section, and then the strong tissues in the lower part of each broad ligament are brought

together in the median line in front of the cervix and sutured there. This operation promises much, both in cases of retrodisplacement and in prolapse of the uterus. It is a comparatively new operation, but there are already several modifications. Its effects are as follows:

- a. Cervix is elevated and held well back in the pelvis. This is sufficient in some cases to keep the fundus uteri forward and to lessen the dragging sufficiently to relieve the symptoms.
- b. It does not strongly elevate the fundus and adnexa.
- c. Like the other vaginal operations, it fails to provide for the thorough exploration and operative treatment of pathologic conditions in the pelvis and lower abdomen.

5. SHORTENING OF SACROUTERINE LIGAMENTS THROUGH A POSTERIOR VAGINAL INCISION.
    - a. Draws cervix well back and upward and throws fundus forward.
    - b. Does not satisfactorily elevate the fundus uteri and the adnexa.
    - c. Tubal and appendiceal complications cannot be so satisfactorily determined or so accurately treated.
6. POSTERIOR VAGINAL SECTION, WITH PACKING OF CERVIX BACK TO FORM ADHESIONS (PRYOR).
    - a. Cervix is fastened well backward and upward and the fundus pushed forward.
    - b. Very uncertain as to whether satisfactory posterior fixation of the cervix will be secured. It may be tried when the culdesac is opened for other cause. The packing may be used advantageously when the sacrouterine ligaments are shortened by vaginal section.
    - c. Does not provide for satisfactory elevation of the fundus uteri and adnexa.

Choice of Operation

What operation is preferable in a particular case depends on the conditions present in that case.

When the uterus is freely movable and stays forward well with a pessary, but the wearing of the pessary is not satisfactory because of tenderness or nervousness or other discomfort, the uterus may be held forward by the extraperitoneal shortening of the round ligaments (Alexander-Adams operation) or by vesicofixation. The former is preferable usually because it gives better elevation of the uterus and adnexa and also gives a more permanent forward fastening. The field of either of these operations is very limited, for most of the cases in which they are efficient may be satisfactorily treated with pessaries. When there is so much disturbance that a pessary is not satisfactory, there is usually some intraabdominal condition that can be more

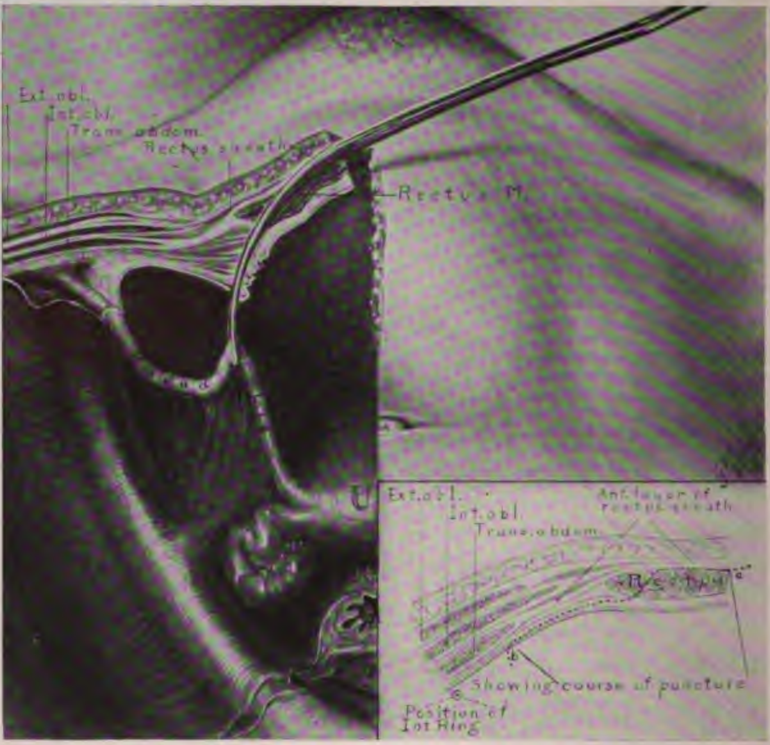


Fig. 562.—An effective method of shortening the round ligaments for retrodisplacement of the uterus. The puncturing tenaculum forceps has been introduced through the wall and is grasping the left round ligament. In introducing the forceps through the wall, the point is carried along the course indicated by the dotted line *a* to *b* in the small sketch in the corner. Notice that the puncture through the strong musculoaponeurotic wall is made at the rectus muscle, while the puncture through the peritoneum is made at *b*, which is near the internal inguinal ring. The distance from *b* to the internal ring is so short (about one inch) that no puckering suture is necessary. This point is further explained in Fig. 563. (Crossen—*Jour. Am. Med. Assn.*)

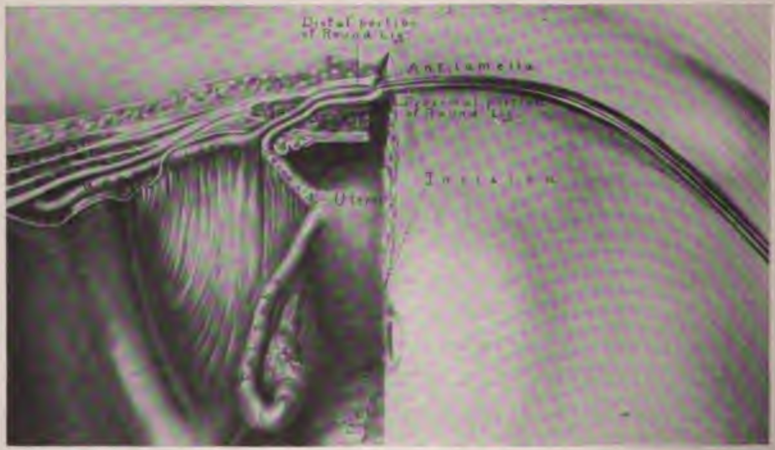


Fig. 563.—The left round ligament drawn into place. Notice that the direction of the pull on the uterus is changed from lateral to anterior. At the same time there is no large opening between the distal portion of the round ligament and the anterior abdominal wall requiring a suture, as in the regular Gilliam-Ferguson operation. The distance from the peritoneal exit of the new ligament to the lateral edge of the peritoneal cavity at this level is so small (represented in the corner sketch in Fig. 562 by the distance from *b* to the internal inguinal ring) that it is closed by moderate traction on the distal portion of the round ligament loop appearing in the wound. If it is desired to bring the uterus farther forward the proximal portion of the ligament is pulled on. (Crossen—*Journal of American Medical Association.*)

satisfactorily handled by abdominal section which permits thorough explorations present in that case.

In those cases in which abdominal section is required, there comes the question as to which is the preferable method of fastening the uterus forward after the abdomen is open. The answer to this depends on the conditions within the pelvis. These conditions vary widely in different cases of retrodisplacement, and in order to handle the cases intelligently they must be grouped into classes representing the principal pathologic conditions. Then, for each class, that operation should be selected which best meets the requirements of that class.

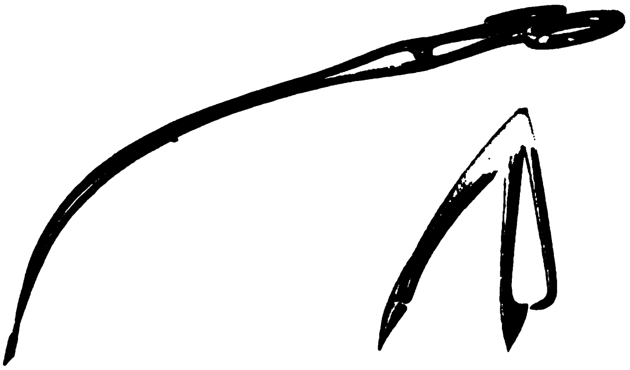


Fig. 564.—The puncturing tenaculum forceps. The instrument is strongly made and slender, and is designed to pass easily through the tissues of the abdominal wall, to penetrate the aponeurosis and peritoneum at any desired point, to grasp the round ligament firmly without bruising it, and to return through the wall, bringing the ligament along the new canal. (Crossen—*Journal of American Medical Association.*)

This definite classification of the cases of retrodisplacement, with a clear comprehension of the obstacle to be overcome in each class, is very important. The matter of classification and the adaptation of the operative measures to the special conditions present in these different classes, is presented at length in the author's "Operative Gynecology."

Figs. 562 to 564 give an idea of Gilliam-Crossen operation, one of the methods of round ligament transplantation in common use.

PROLAPSE OF THE UTERUS

Prolapse of the uterus is that condition in which the uterus sinks decidedly below its normal level in the pelvis. It is known also as "procidentia uteri" and is frequently referred to by the patient as "falling of the womb."

Etiology and Pathology

The causes of prolapse are practically the same as those of retrodisplacement. In fact, a slight prolapse is usually the first step in retrodisplacement. (Fig. 565.)

The uterus normally has considerable up and down movement. Respiration causes movement of the uterus, which is noticeable during the speculum n, especially with the patient in the Sims posture.

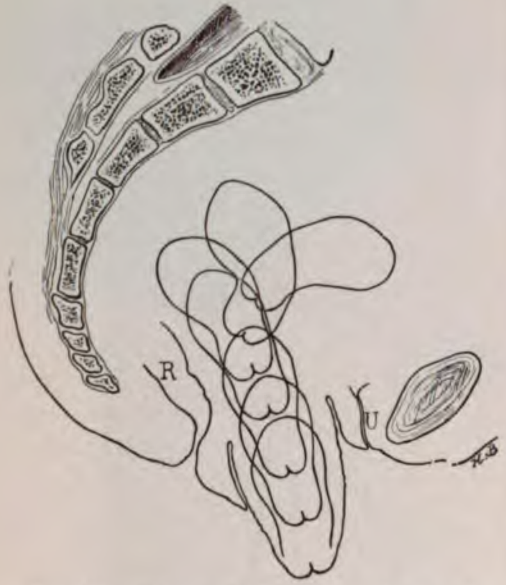


Fig. 565.—Prolapse of the uterus, showing the various steps in the process. (Kelly—*Operative Gynecology.*)

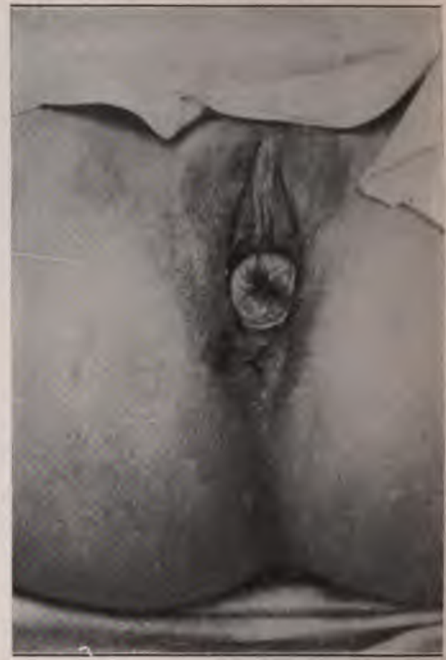


Fig. 566.—Prolapse of uterus—first degree, the cervix coming to the vaginal outlet. (Hirst—*Diseases of Women.*)

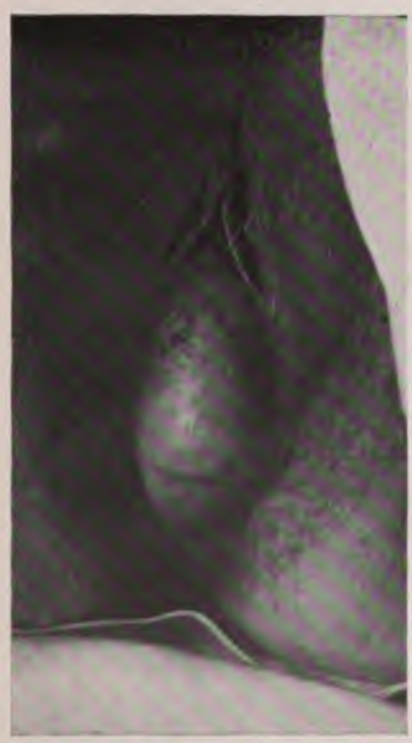


Fig. 567.—Prolapse of uterus—second degree, the uterus coming a considerable distance outside the body.

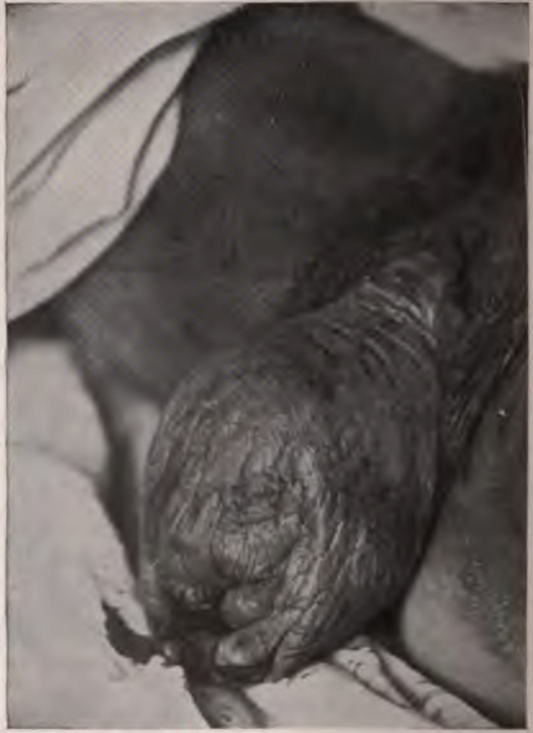


Fig. 568.—Prolapse of uterus—third degree, the entire uterus lying outside. (Hirst—*Diseases of Women.*)

There may be considerable exaggeration of the usual downward displacement without any symptoms, and that could hardly be called pathologic. The condition is not called prolapse unless there is marked downward displacement, and this is almost always accompanied with backward displacement of the uterus.

If the cervix is still well within the vagina, the condition is designated as prolapse of the FIRST DEGREE (Fig. 566). If the cervix protrudes from the vaginal orifice it is called the SECOND DEGREE (Fig. 567). If the uterus lies outside the pelvis it is called the THIRD DEGREE, or complete prolapse (Fig. 568).

In the usual case of prolapse, the uterus is found retrodisplaced and low in the pelvis, the pelvic floor is found lacerated and there is present more or less endometritis with discharge. The vaginal walls also are relaxed and thrown into folds by the position of the uterus, and may be found projecting outward at the vaginal opening, forming an anterior or posterior colpocele.

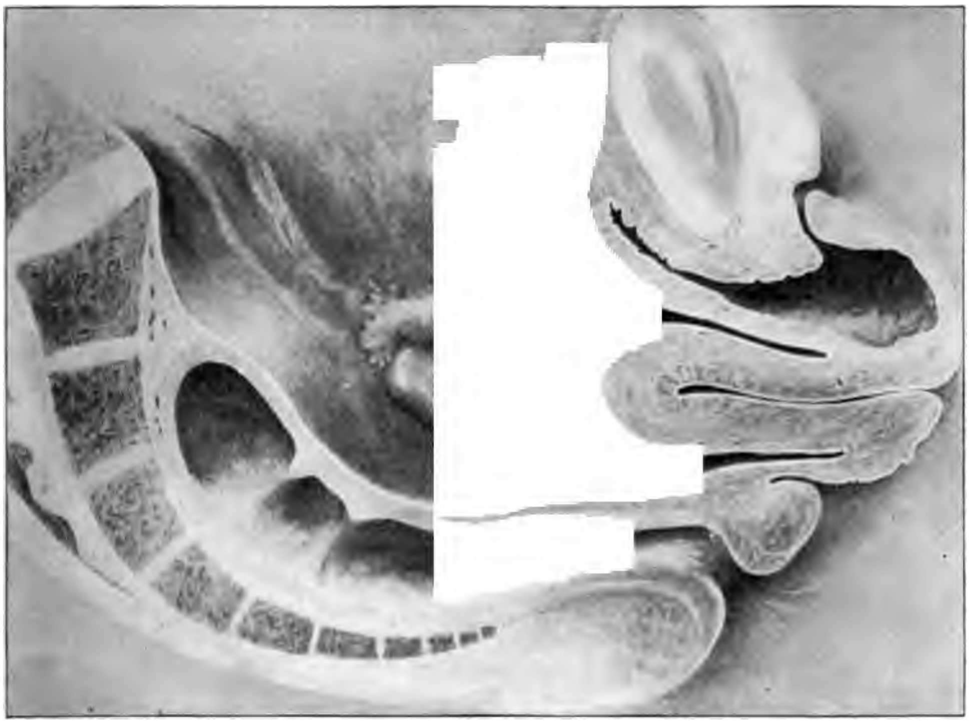


Fig. 569.—Prolapse of the uterus and bladder. (Doederlein and Kroenig—*Operative Gynaekologie.*)

The projecting vaginal wall precedes the cervix on its downward journey. If the bladder follows the projecting vaginal wall, as it frequently does in severe prolapse, the condition is known as cystocele (Fig. 569). In some cases of severe prolapse, the anterior rectal wall follows the projecting posterior vaginal wall, forming rectocele.

The cervix in many cases has been severely lacerated and is chronically inflamed and is the seat of cystic disease and of irritating discharge. In severe prolapse, ulcers often appear on the cervix or vaginal walls, being due to irritation of the clothing and to interference with the circulation of the prolapsed portion (Fig. 568). The interference with the circulation may be due to two factors—constriction of the prolapsed portion by the vaginal opening and stretching of the uterine blood vessels with consequent diminution in their caliber. All the ligaments of the uterus are stretched until they give practically no support, and the lower pelvis is occupied by the intestines instead of by the pelvic organs. Sometimes coils of intestines may lie in the culdesac back of the uterus, outside the vaginal opening.

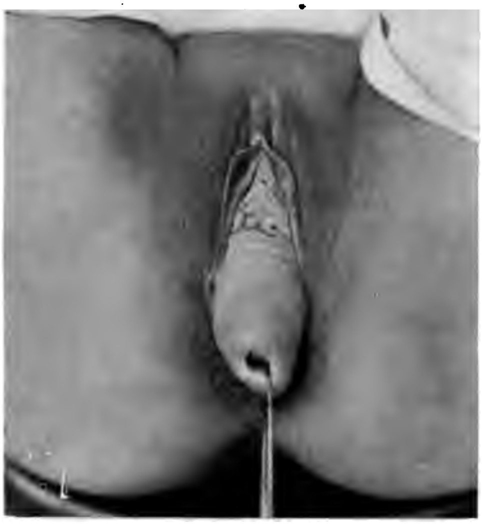


Fig. 570.—Prolapse of the uterus in a nullipara. (Hirst—*Diseases of Women.*)

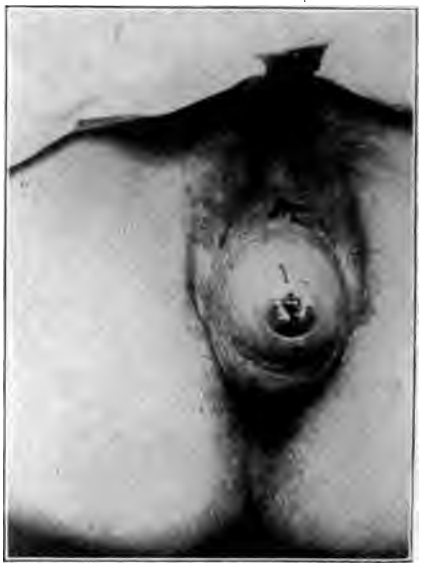


Fig. 571.—Prolapse of the uterus in a virgin. (Kustner—*Kurzes Lehrbuch der Gynakologie.*)

Though prolapse of the uterus is usually due to conditions incident to childbirth, it is found occasionally in the nulliparous (Fig. 570) and even in the virgin (Fig. 571).

Symptoms

The symptoms of prolapse of the uterus are dragging pains in the back and pelvis, worse when walking, some protrusion at the vulva and sometimes difficulty in urinating. In some cases the protruding bladder must be pushed back into the pelvis before the patient can urinate. Even then there is more or less residual urine which is likely to lead to cystitis. Some patients complain of partial incontinence of urine when coughing or laughing. In exceptional cases, it is this partial incontinence that brings the patient to a physician, and he must recognize the cause or he will fail in the treatment.

Examination reveals as follows in the different degrees of prolapse:

First Degree.—The pelvic floor is relaxed and there is more or less protrusion of the vaginal walls. The uterus is usually retroverted and the cervix is low in the pelvis and far forward, near or at the vaginal opening (Fig.

566). Coughing or straining causes the cervix to sink lower and the vaginal walls to protrude more.

If there is still doubt as to whether the uterus sinks low enough to be called prolapse or to cause symptoms, the patient may be examined in the standing posture (see Chapter I, examination of cervix uteri), but this is rarely necessary.

Second Degree.—The cervix is found presenting at the vulva and may be made to protrude by bearing down (Fig. 567). There is also protrusion of the vaginal walls and sometimes of the bladder. Rectoabdominal examinanation (Fig. 572) shows the fundus uteri low in the pelvis.

The cervix and vaginal walls may return into the pelvis when the patient is lying down. There is more or less erosion about the cervix and sometimes ulceration.

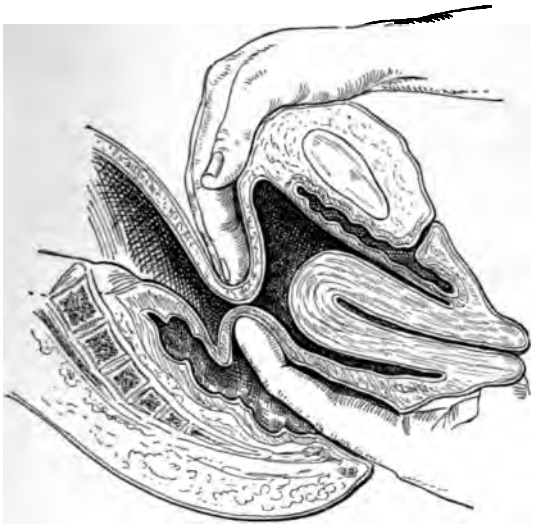


Fig. 572.—Locating the body of the uterus by recto-abdominal palpation in a case of suspected prolapse. (Ashton—*Practice of Gynecology.*)

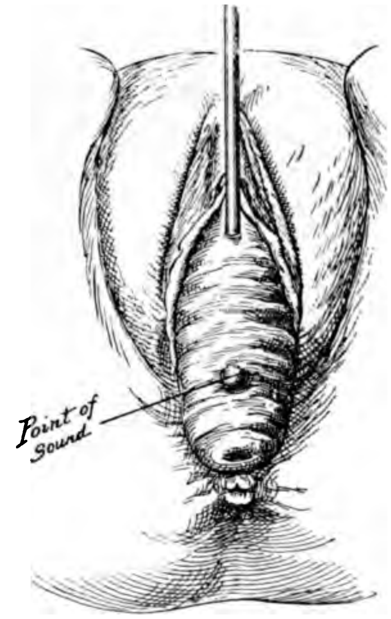


Fig. 573.—Testing for prolapse of the bladder by means of a sound in the bladder. (Ashton—*Practice of Gynecology.*)

Third Degree.—There is a mass nearly as large as the fist protruding from the vulva and lying between the thighs (Fig. 568). It is covered by the turned out vaginal wall which, from friction of the clothing, has become dry and hard resembling ordinary epidermis. At the lower part of the mass is the cervix, which is represented by a hard nodule with an opening in the center and more or less erosion or ulceration about it. The appearance of the cervix depends upon how much laceration of the cervix there has been.

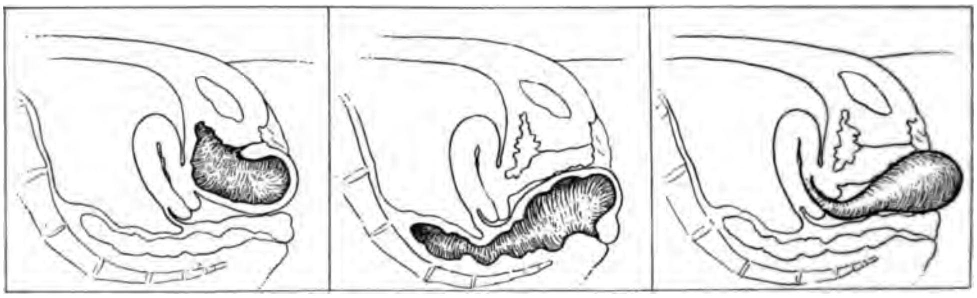
Grasping the mass and palpating it to determine its contents, there is found a hard elongated mass—extending upward from the cervix. Usually the size and shape of the uterus can be accurately made out. From the cervix there is more or less discharge which may be clear and glairy, resembling the white of an egg, or it may be mucopurulent.

If the bladder has prolapsed also, it is felt as a thick cushion of soft tissue in front of the hard uterus. To determine just how much the bladder is displaced, a sound may be introduced into it and the outline of the cavity thus determined (Fig 573). The vaginal wall often presents spots of ulceration, especially about the cervix, and there is often much irritation over the whole prolapsed mass and about the external genitals.

Diagnosis

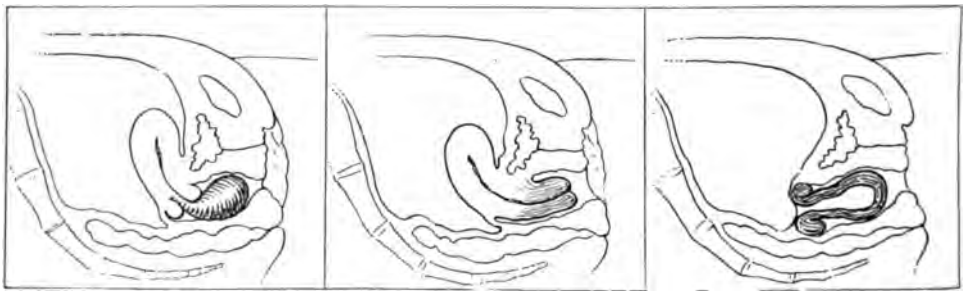
The diseases from which prolapse must be differentiated are as follows:

1. **Hypertrophy of Cervix.**—In this condition (Figs. 486 and 487, 575-B)



A. *B.* *C.*

Fig. 574.—Differential diagnosis of prolapse of uterus. Other conditions that cause a projecting mass at the vaginal outlet, and which may be mistaken for uterine prolapse. *A*, Cystocele. *B*, Rectocele. *C*, Projecting pediculated myoma.



A. *B.* *C.*

Fig. 575.—Differential diagnosis of prolapse of uterus. Other conditions that cause a mass low in the vagina. *A*, Pediculated myoma from uterus. *B*, Elongated cervix uteri. *C*, Inverted uterus.

the body of the uterus is felt nearly at its normal height in the pelvis. Also the depth of the uterus is increased, the amount of increase depending on the length of the hypertrophied cervix. Furthermore, the posterior vaginal wall is usually not pushed down, as it would be by a prolapse of the uterus, and the bladder is usually not involved in the projecting mass.

2. **Tumor or Cyst of Vagina.**—Anything that causes the vaginal walls to swell over a limited area and protrude (Fig. 574), may be mistaken for prolapse of the uterus, for example, cystocele, rectocele, vaginal cyst, vaginal hernia, or tumor of vaginal wall. In all these conditions, by careful digital

examination, the cervix may be felt above the projecting mass and near its normal position.

3. **Tumors of Uterus, Projecting From Cervix.**—Such tumors are, of course, more or less pediculated and almost invariably they are fibroids. In such cases, there is felt near the vaginal entrance, a mass, which may be hard or soft (Fig. 575-A). If the mass is sloughing, part of it will be soft. No cervical opening can be felt in the mass and, by exploring higher around the mass, the cervical ring can be felt at the upper part of the vagina. If the tumor is sloughing, there is usually bleeding and a very offensive discharge. Furthermore, by bimanual examination, the body of the uterus may be felt near its normal position.

4. **Inversion of Uterus.**—In a case of inversion, a large mass, apparently a tumor, is felt in the vagina (Figs. 590, 575-C). The vaginal walls can be felt extending up past the mass. If it is sloughing, there will be bleeding and a foul discharge. Furthermore, the body of the uterus is not felt where it ought to be (Fig. 591-A). It is apparently nowhere in the pelvis, and by deep bimanual examination a depression may be felt with the abdominal hand at the upper end of the vagina—a cup-shaped depression with a hard margin, where the body of the uterus should be (Fig. 591-B). Inversion differs from a tumor, in that a sound cannot be introduced far into the uterus, for the cavity is more or less obliterated.

Treatment

The means of treatment may be divided into two classes—palliative and curative.

Palliative Measures

The palliative measures make the patient more comfortable, by relieving the irritation which causes the ulceration and by diminishing the dragging on the uterine supports.

1. **Treatment of the Ulceration and Erosion, and Reduction of the Mass.**—All secretion should be cleansed from the extruded mass and from the adjacent surfaces. Areas of ulceration or erosion should be touched with some astringent silver preparation or with 10 per cent copper sulphate solution, and dusted with an antiseptic-astringent powder.

The mass should then be anointed with an antiseptic ointment and reduced within the pelvis. By bimanual manipulation, the backward displacement should be corrected so far as possible, the fundus being brought forward and the cervix pushed far back in the pelvis.

2. **Pessaries.**—The next step is to hold the uterus in the pelvis as near its normal position as possible. If there is enough left of the pelvic floor to hold a pessary, that should be tried.

Pessaries for Prolapse of Uterus

The treatment for prolapse is to raise the uterus and maintain the fundus in a forward position. The pessary that accomplishes this in a case of retrodisplacement is likewise beneficial in a case in which the prolapse is the principal feature. Consequently, in the milder grades of prolapse, a Smith or Hodge Pessary (Fig. 549) may be all that is necessary to maintain the uterus in its proper position.

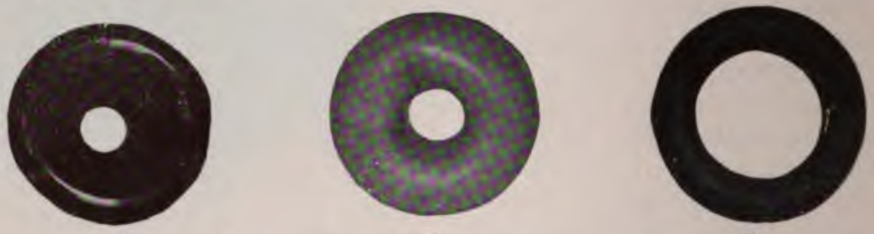

A. B. C.

Fig. 576.—*A.* Flexible ring pessary. *B.* Inflated ring pessary. *C.* Hard rubber disk pessary.

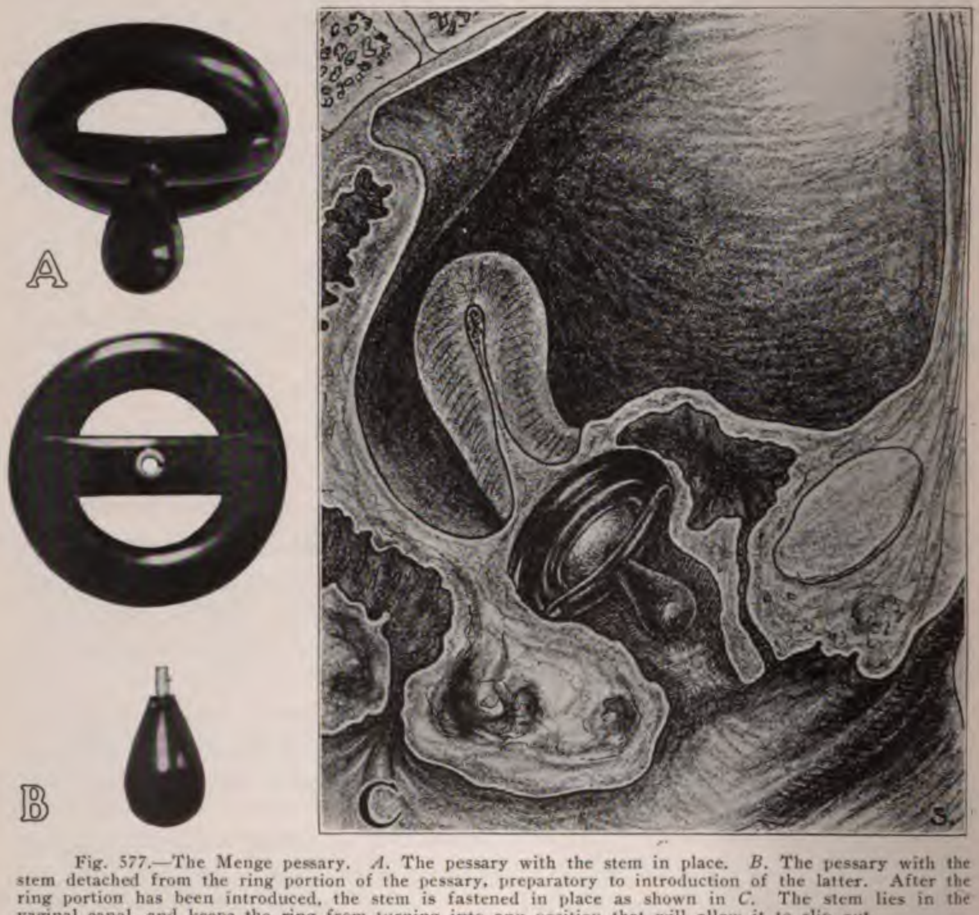


Fig. 577.—The Menge pessary. *A.* The pessary with the stem in place. *B.* The pessary with the stem detached from the ring portion of the pessary, preparatory to introduction of the latter. After the ring portion has been introduced, the stem is fastened in place as shown in *C.* The stem lies in the vaginal canal, and keeps the ring from turning into any position that will allow it to slip out.

In many cases of prolapse, however, more so than in retrodisplacement, the pelvic floor has been torn so much that this form of pessary will not stay in satisfactorily. In such a case, a large inflated rubber ring pessary (Fig. 576) may be introduced and then turned so it will not slip out. This does not hold the cervix back in the pelvis and the fundus forward, but it does plug the vaginal opening so the redundant vaginal wall and the uterus cannot prolapse to the former extent. If the pessary tends to protrude, a pad over the genitals, with a firm T-bandage, may keep it in place comfortably.

Menge Pessary.—A large thick rubber ring, turned crosswise in the vaginal canal will plug the opening effectually for a time. But when the patient walks around for a few hours, the ring shifts about until the edge is turned toward the relaxed vaginal opening and then it slips out. The Menge pessary (Fig. 577, A) consists of such a hard rubber ring, with a stem which prevents the pessary from turning. The stem is detachable as shown in Fig. 577, B. The thick ring is introduced the same as any large ring pessary and turned across the vaginal canal, with the hole in the cross-bar directed toward the vaginal opening. The stem is then fastened in place. The stem lying in the vaginal canal as shown in Fig. 577, C, prevents the ring from turning, and hence the vaginal opening is persistently blocked and the prolapse prevented.

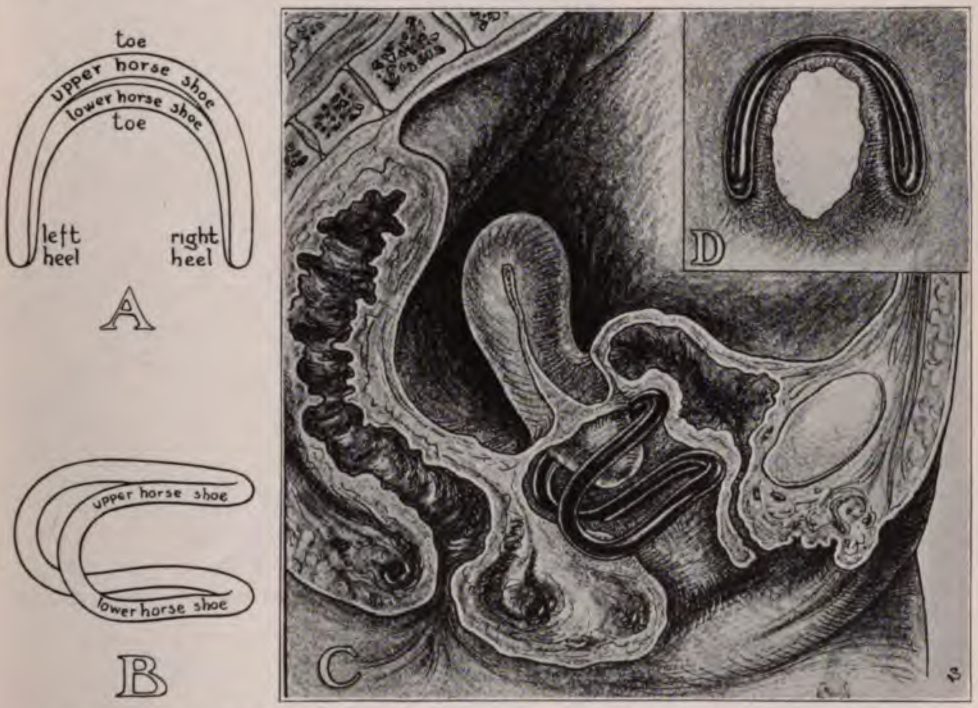


Fig. 578.—The Gehrung pessary. *A.* The pessary as viewed from above. *B.* The pessary as viewed from the side. *C.* The pessary in place, showing the action of the upper arch in holding up the uterus and base of the bladder. *D.* Showing how the heel on each side indents the tissues some distance from the vaginal opening, instead of pressing into the opening like a wedge, as do other pessaries.

This pessary has proved very useful in severe cases, where operation was inadvisable or was refused, or where temporary relief was required while the patient was waiting for operation.

Gehrung Pessary.—The Gehrung pessary consists of two light arches of horseshoe shape joined at their heels (Fig. 578, A and B). When in position (Fig. 578, C) the lower arch or horseshoe secures support on the remnants of the pelvic floor at the sides of the vaginal opening (Fig. 578, D). This in turn supports the upper arch, which holds up the bladder and uterus, as shown in the illustration. This is the most satisfactory pessary that the author has found so far for the treatment of inoperable prolapse or cystocele. The secret of its effectiveness in the severe cases with almost no pelvic floor, lies in the method of obtaining support from the remnant of the pelvic floor. With the ordinary pessary the lower supporting portion presses against the vaginal opening in the form of a wedge, which tends to stretch the opening more and more—until finally the pessary slips out. Owing to the wedge shape of the presenting part of the pessary, there is a sidewise pressure which tends to push aside the shelf of pelvic floor upon which the pessary must depend for support.

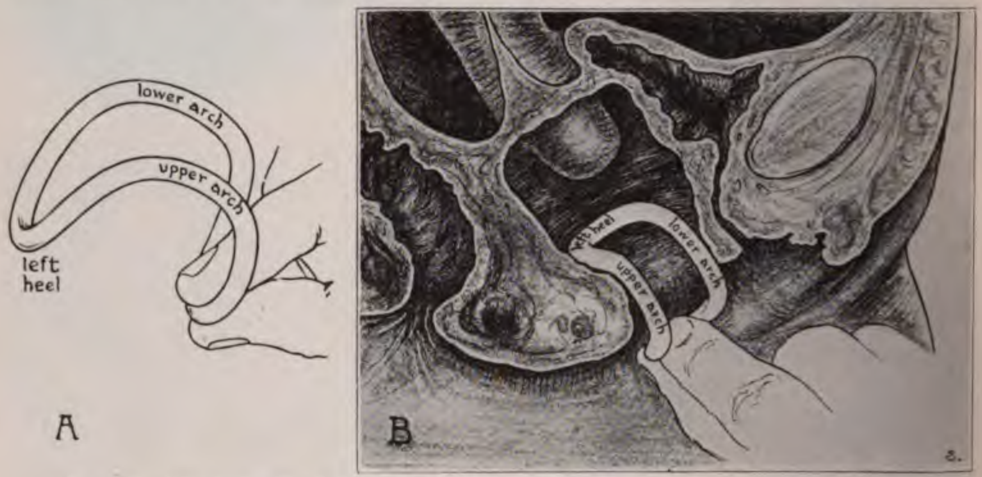


Fig. 579.—Introducing the Gehrung pessary. *A.* Showing how the pessary is held. *B*, First step in the introduction—see directions for introduction.

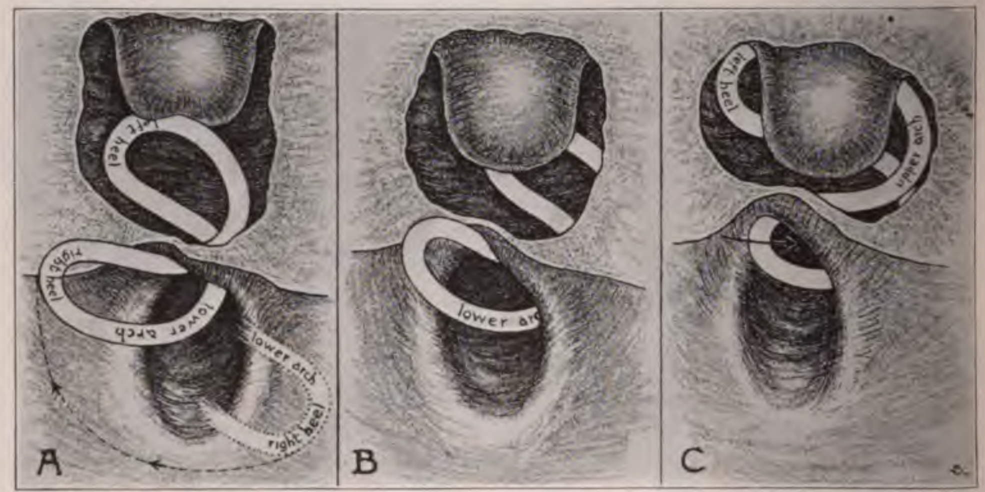


Fig. 580.—Introducing the Gehrung pessary. *A.* Swinging the right heel to the right side, which carries the left heel under the cervix to the left side and brings up the upper arch, which was below. *B.* Pushing the pessary around the vaginal wall back of the cervix, in order to get the right heel within the vagina. *C.* Further progress in the same direction.

The result is that the small shelf of pelvic floor on each side is gradually flattened out against the pelvic wall, permitting the pessary to slip out. Even the Menge pessary has this wedge action to some extent.

With the Gehrung pessary, on the other hand, the supporting part of the arch, on each side presses into the shelf of tissue from above and some distance from its margin, as indicated in Fig. 578, D. This pressure **into** the superior surface of the supporting shelf causes a depression on each side (Fig. 578, D) in which the pessary becomes "set" so that it does not slip around. The more the pressure the more firmly it becomes set, after it is well placed. Acting in this way it does not tend to stretch the vaginal opening and slip out, as do the pessaries with wedge action. In fact, after this pessary has been worn for a while and is well set in each side, a smaller one will often answer the purpose. The parts seem to contract somewhat, when relieved for a time from the dilating wedge of prolapsed tissue.

The introduction and satisfactory adjustment of the Gehrung pessary requires considerable study and experience. In introducing the pessary the right heel is grasped in the fingers of the right hand, as shown in Fig. 579, A. The upper arch is below. With the right heel held to the left side of the vulva, the left heel of the pessary is pushed into the vaginal opening as far as it will go (Fig. 579, B). Then the right heel, still grasped in the fingers of the right hand, is swung across to the right side as indicated in Fig. 580, A. This brings uppermost the upper arch which was below, and causes the left heel of the pessary to pass under the cervix (Fig. 580, A) to the patient's left side (Fig. 580, B). Now the pessary is pushed in farther, the left heel passing around back of the cervix (Fig. 580, C) far enough to permit the right heel to slip inside (Fig. 580, C). The right heel of the pessary is then pushed along the vaginal wall to the right side (Fig. 581, A), until the right and left heels are situated symmetrically on each side of the vaginal opening (Fig. 581, B). The next step is to push the pessary up (Fig. 581, B) until the lower arch lies above the vaginal opening and back of the urethra, and the upper arch sup-

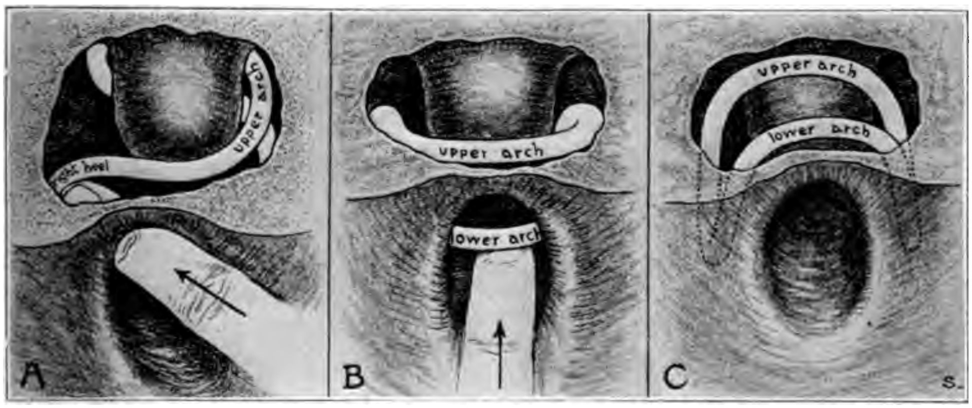


Fig. 581.—Introducing the Gehrung pessary. *A*, The right heel within the vagina and being carried to its position on the right side. *B*, The two heels situated symmetrically on each side. The arches are still too low. *C*, The arches pushed up into place back of the symphysis.

ports the uterus and base of the bladder (Fig. 581, C). This puts the supporting arches in the position shown in Fig. 578, C, and the heels of the pessary take hold at the sides of the vaginal opening as indicated in Fig. 578, D.

If the heels tend to slip around at first, a little tannic acid powder may be used on each side, to prevent slipping until the heels become set.

Hewitt Pessary.—This pessary consists of three air-cushion pessaries securely fastened together. The three air-cushions differ in size, the largest being at the bottom and the smallest at the top (Fig. 582, A). This pyramidal air-cushion acts as a plug to block the vaginal opening (Fig. 582, B) and prevent the escape of the uterus or bladder. It presents the following advantages: (1) the superimposed rings give a pyramidal shape to the pessary and thus it holds up the base of the bladder and the redundant vaginal walls more effectively than a single ring; (2) the added length prevents the pessary turning and hence has much the same effect as the stem in the Menge pessary; (3) the patient herself may remove the pessary for cleansing and replace it. It presents the following disadvantages: (1) like all large ring pessaries, it has the wedge action which tends to stretch the vaginal opening and cause the pessary to work out, unless so large as to make uncomfortable pressure; (2) its action is simply that of a ball-stopper and hence it must necessarily be large and heavy; (3) it interferes with coitus and with satisfactory douching; (4) being of soft rubber, it must be removed for cleansing very frequently.

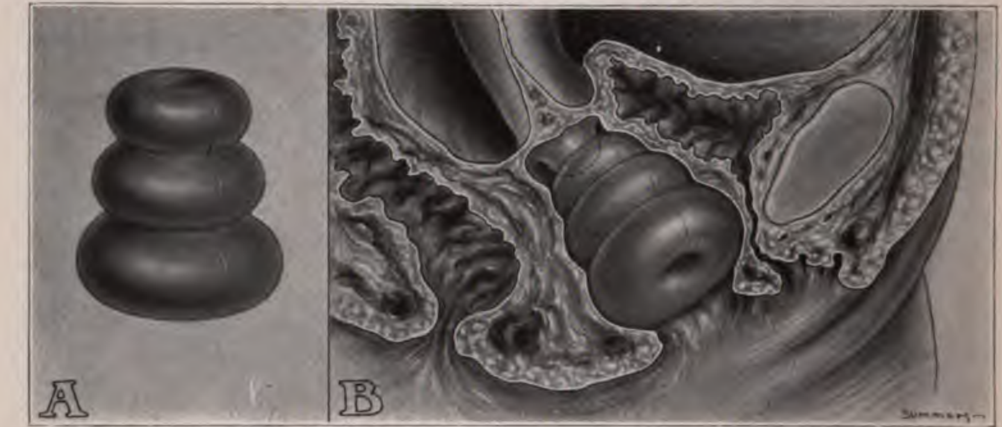


Fig. 582.—The Hewitt pessary. *A*. Showing the construction of the pessary—three inflated soft rubber rings, fastened together. *B*, The pessary in place, showing the action of the pyramid in holding up the uterus and the base of the bladder. The length of the pessary prevents its turning, as does the ordinary single-disk pessary.

The Hewitt pessary in action and effectiveness is about like the Menge. They are each inferior to the Gehrung pessary in effectiveness, comfort and restoration of physiological function. The two light arches of the Gehrung pessary give the required support without unnecessary weight and without plugging the vagina. Hence sexual intercourse may take place, effective douching is possible and the pessary when well adjusted may be worn for several weeks and even several months without removal. But the other two pesmentioned are much more easily understood and hence will have more general use.

Cup and Belt Pessary.—This form of support consists of an abdominal belt to which are attached rubber cords which in turn hold in place a hard rubber stem and cup extending into the vagina (Fig. 583). It is an old form of pessary which sometimes gives much relief in extreme cases in which every form of pessary depending on the pelvic floor for support, slips right out. Of course this pessary as well as other pessaries are only makeshifts giving temporary relief, and curative operative procedures are indicated in suitable cases. But some of these women are not in physical condition for operation, while some others refuse operation, preferring to get along with a fairly satisfactory pessary. A modification sometimes useful is that form in which a ball is substituted for the cup at the top of the stem.

3. **Tampons, Rest in Bed, Astringent Douches.**—Where no form of pessary will hold the structures back, a firm vaginal packing of gauze or cotton tampons may be placed, preferably with the patient in the knee-chest posture or in Sims' posture. This packing will hold the uterus up temporarily and, by placing a pad over the vulva and holding it firmly in place by a strong T-bandage, the packing may be kept in place two days. This method is very useful when treating the ulceration often found about the cervix and also to give temporary relief while preparing the patient for operation.

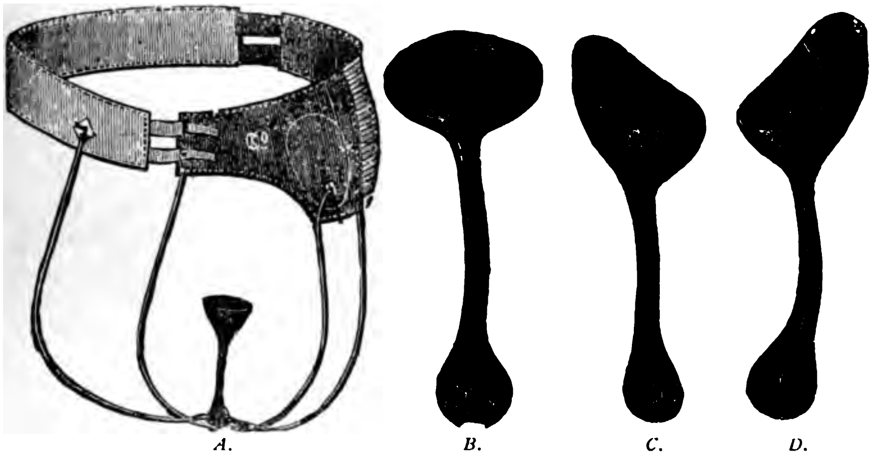


Fig. 583.—*A*. Cup and belt pessary. *B*, *C*, *D*. Different cups that may be used.

If the patient can spare the time to go to bed and remain there a week or two, taking astringent douches when not packed, she will experience considerable relief from pain and discomfort. This is especially important when there is ulceration of the cervix or vagina requiring treatment.

Curative Measures

These are all operative and may be divided into two classes—(a) those that preserve all the genital functions and (b) those that do not.

A. **Genital Functions Preserved.**—The uterus and adjacent structures are restored to approximately normal position and all the genital functions are preserved.

1. Fastening of Fundus Uteri Forward and Upward, and Repair of Pelvic Floor. The body of the uterus is brought forward and elevated and the fundus is fastened in the desired position by one of the methods detailed under retrodisplacements. The pelvic floor is thoroughly repaired by one of the methods detailed in Chapter V. A curettage is usually combined with the above measures to reduce the weight of the uterus, and if the cervix is sufficiently enlarged or elongated, a part of it is amputated (see Chapter VI).

All this may be done during one anesthesia or it may be divided into two operations some weeks apart, as thought best in the particular case. These measures are carried out in such a way that the function of pregnancy and parturition is not interfered with. In fact, the chance of pregnancy is increased by the restoration of the uterus to its normal position.

Practically all cases of prolapse in the child-bearing period can be treated satisfactorily in this way, where the form of operation best adapted to the particular case is selected and the proper technic employed. There are exceptional cases, but they are very rare. The principles of this operative treatment are illustrated in Fig. 584.

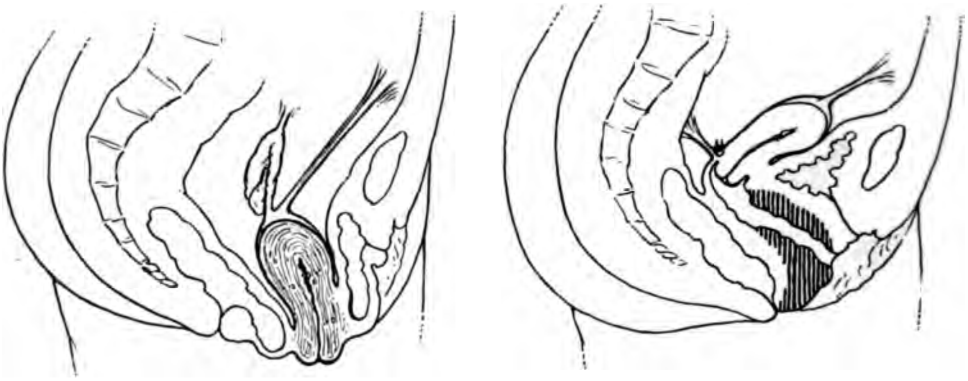
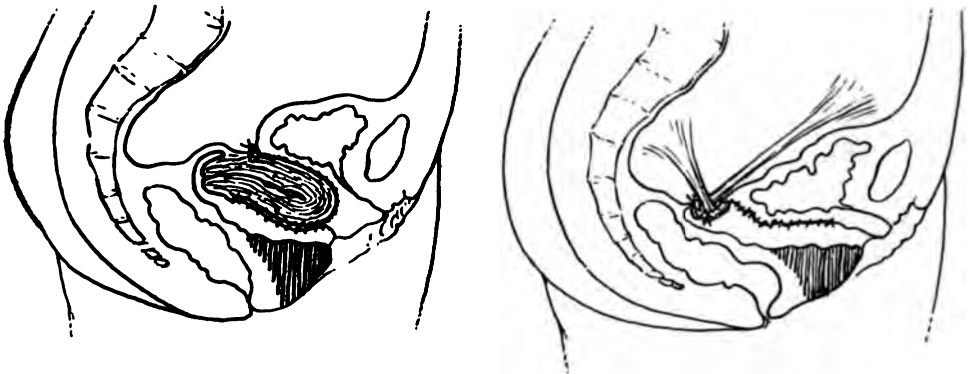

A. *B.*

Fig. 584.—The principles of operative treatment for prolapse of uterus in the child-bearing period. *A*, the conditions to be corrected. There is prolapse of the uterus and bladder, relaxation of the pelvic floor and overstretching of the upper uterine ligaments. *B*, the corrections made. The uterosacral and round ligaments have been shortened, by abdominal operation, the subvesical fascia repaired by vaginal operation and the pelvic floor repaired. None of these corrections preclude subsequent parturition.

2. Bringing a Strong Portion of the Lower Part of Each Broad Ligament in Front of the Cervix Uteri and Fastening it There. This is accomplished through an incision in the anterior vaginal vault. It promises much in these cases, especially when combined with shortening of the sacrouterine ligaments and operation for cystocele and repair of the pelvic floor. It has not yet been long enough in use to demonstrate certainly how well the shortened broad ligaments will stand the strain.

B. **Genital Functions Sacrificed.**—The uterus is removed or partly removed or so placed that pregnancy would be dangerous. These measures are, of course, applicable only to patients past the menopause or in the menopause, or in whom for some reason pregnancy cannot again occur.

1. **Utilization of the Uterus to Overcome Prolapse of Bladder a Vaginal Walls** (Freund, Fritsch, Watkins, Wertheim). Through an incision i the anterior vaginal wall, the bladder is separated from the vagina an uterus, and pushed up. Then the fundus uteri is brought forward beneatl the bladder and fastened securely to the anterior vaginal wall. The redundant portion of the anterior vaginal wall is cut away. The sutures extend deeply at the sides so as to unite the firm lateral tissues to the uterus and thus give good support to the bladder and other structures above. This,

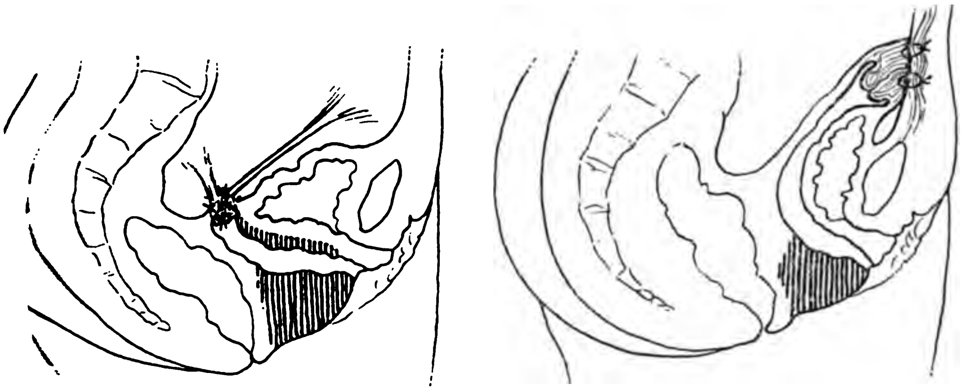


A. *B.*

Fig. 585.—The principles of operative treatment for prolapse of uterus after the menopause—vaginal operations.

A, The subvesical interposition operation. The bladder is separated from the uterus and pushed up, the corpus uteri is fastened beneath the bladder, the anterior vaginal wall is closed over the uterus, and the pelvic floor is repaired.

B, Vaginal hysterectomy for prolapse. The bladder is separated from the uterus and pushed up, the uterus is removed, the uterosacral and round ligament pedicles are fastened at the vaginal vault and under the bladder, the subvesical fascia is repaired and the pelvic floor is repaired.



A. *B.*

ig. 586.—The principles of operative treatment for prolapse of uterus after the menopause—
ial operations.

Abdominal hysterectomy with fixation of stump to pelvic pedicles. The uterus is removed
gi nal or complete) and the stump is fastened high up on the pelvic pedicles. Then by vaginal
the subvesical fascia is strengthened if necessary and the pelvic floor is repaired.

Abdominal hysterectomy with fixation of stump to abdominal wall. The uterus is removed
ri nal or complete) and the stump is fastened securely in the abdominal wall. Then the pelvic
paired.

same time, turns the cervix into the posterior part of the pelvis and e vaginal walls on the stretch and prevents their prolapse. This is d with a strong repair of the pelvic floor. The special steps and the various modifications, it will not be necessary to detail here. The principles of the treatment are illustrated in Fig. 585-A.

2. Hysterectomy, Either Vaginal or Abdominal, with High Fixation of the Vaginal Stump, and followed by repair of the pelvic floor either at the same sitting or later. The principles of the vaginal hysterectomy treatment for prolapse are illustrated in Fig. 585-B, and those of the abdominal hysterectomy treatment in Fig. 586.

Particular attention must be called to the fact that hysterectomy fails in many cases to cure the prolapse of pelvic structures unless particular care is taken to fasten the vaginal stump very high. Without this precaution, the vagina is liable to prolapse again. The intestines and bladder also come down and the last state of the patient is worse than the first. This defect of the old vaginal hysterectomy for prolapse the author pointed out and illustrated by cases that came to him from other operators, some years ago when that operation was at its height as a cure for this affection.

Hysterectomy as mentioned above, however, with high fixation of the vaginal stump (to the broad ligament stumps or to the inferior abdominal wall), is a different proposition and is effective in relieving the distressing symptoms.

OTHER DISPLACEMENTS OF UTERUS

Anteflexion of the Cervix Uteri.—In this affection the cervix uteri is bent forward so that the axis of the cervix is directed along the vaginal canal instead of across it. The axis of the cervix forms a sharp angle with that of the corpus uteri, the point of bending being at the internal os.

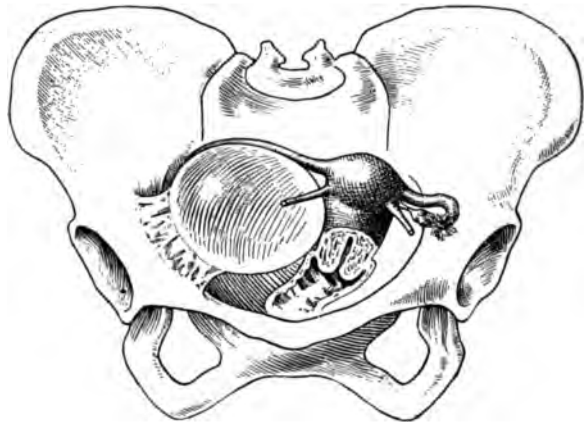


Fig. 587.—Uterus pushed to the left side by a tumor or inflammatory mass in the opposite side. (Findley—*Diagnosis of Diseases of Women.*)

Anteflexion of the cervix uteri is nearly always a developmental defect, due to the persistence of the fetal position of the cervix uteri, as explained when considering the anatomy of the uterus at different periods of life (see Chapter VI.

Almost the only symptom of anteflexion of the cervix is dys

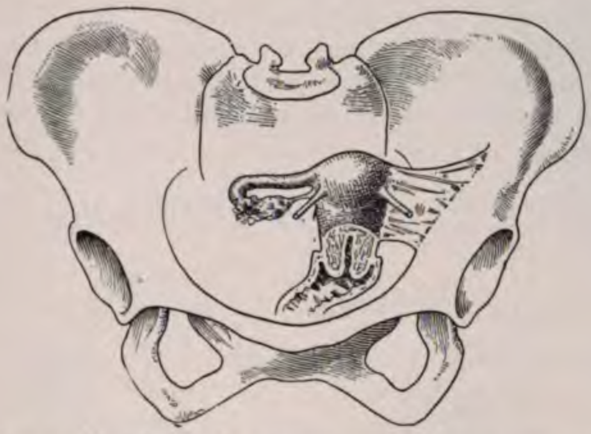


Fig. 588.—Uterus drawn to the left side by adhesions or infiltration in the same side. (Findley—*Diagnosis of Diseases of Women.*)

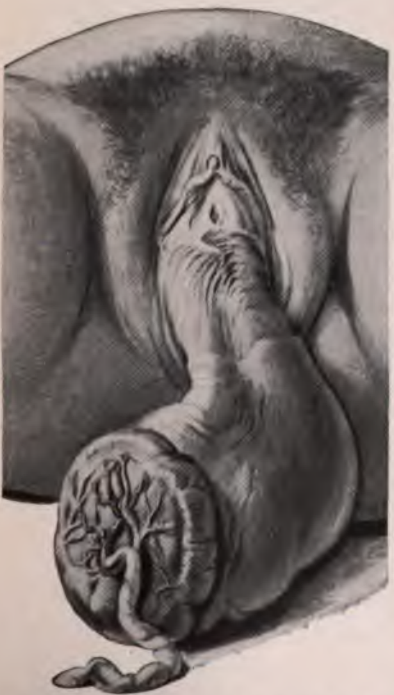


Fig. 589.—Complete inversion of the uterus, forming a large mass at the vulva. This is a postpartum inversion and the placenta is still attached to the turned-out fundus uteri. (Williams—*Obstetrics.*)

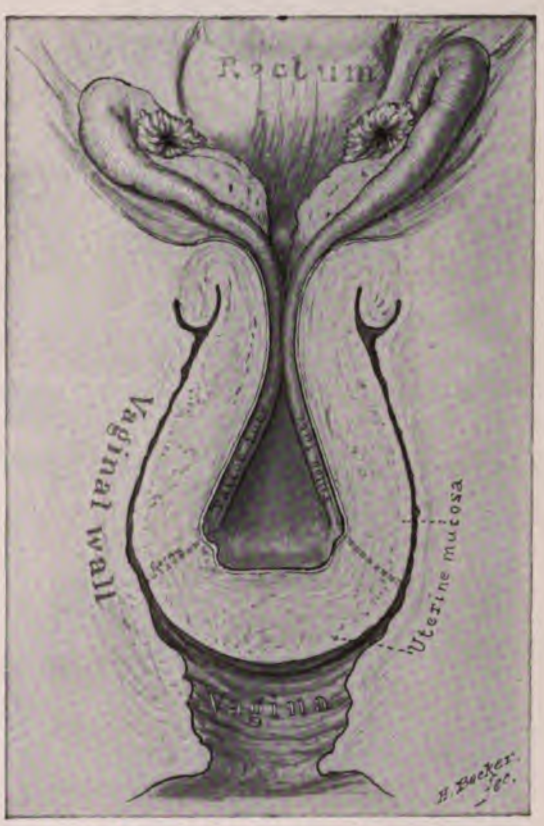


Fig. 590.—Inversion of the uterus forming a mass in the vagina. (Kelly—*Operative Gynecology.*)

and, therefore, it seems best to consider the subject in detail in Chapter XIV, under the "neurotrophic" form of dysmenorrhea.

Anteflexion of the Corpus Uteri, Anteversion of the Corpus Uteri and Lateral Displacements of the Uterus can hardly be classed as diseases. They occur only as symptomatic disturbances in the course of other diseases, and of themselves do not give rise to symptoms or require treatment (Figs. 587, 588).

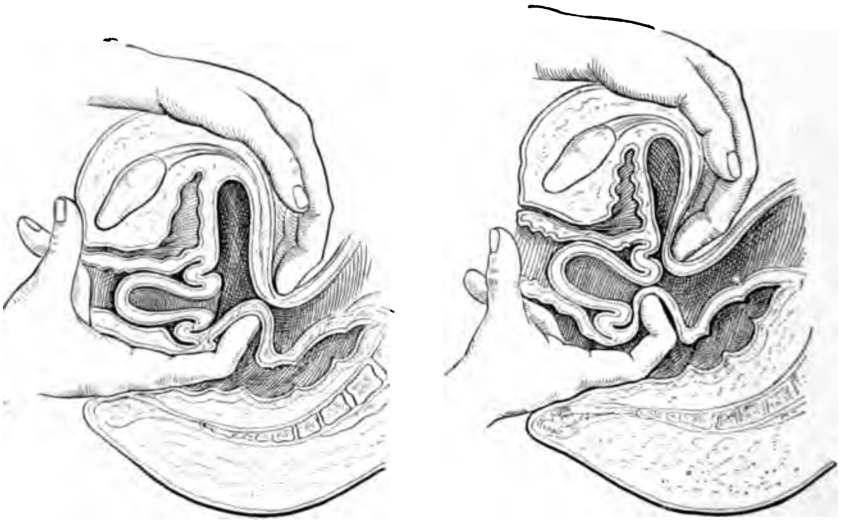


Fig. 591.—Diagnosis of inversion of the uterus. *A*. Determining the absence of the body of the uterus from the pelvic cavity. *B*. Determining the presence of a cup-shaped depression above the cervix. (Ashton—*Practice of Gynecology.*)

Inversion of the Uterus.—This serious and rare displacement (Figs. 589, 590, 591) is an obstetric affection. It practically always occurs in the puerperal state, except when due to the dragging weight of a tumor. When due to a tumor (Fig. 653), it simply constitutes one of the pathologic conditions incident to the tumor and does not require separate consideration.

CHAPTER VIII

NON-MALIGNANT TUMORS OF UTERUS

MYOMA OF THE UTERUS

Myoma of the uterus is a tumor composed of fibrous and muscular tissue. It is called also uterine "fibroid" and uterine "fibromyoma." A certain type contains glands and is designated "adenomyoma."

Etiology

The essential cause is not known. Some interesting theories have been advanced, but they are still theories only. The tumor is analogous to those growths which frequently enlarge the prostate in the male. As bearing on the etiology of uterine myomata, it may be noted that they are usually multiple, there being but few exceptions to the rule that where there is one palpable myoma there are many smaller nodules. They occur most frequently in middle life (period of sexual activity), though they may occur at any age. Again, child-bearing apparently has no influence in causing them, in fact, they are more frequent in the nonparous uterus. This is in marked contrast to carcinoma, particularly carcinoma of the cervix, which occurs almost exclusively in women who have borne children or who have had some injury to the cervix.

Pathology

Myoma may occur as a single growth or there may be many tumors in a uterus so affected, usually the latter. The pathology will be taken up under four headings as follows:

1. Structure.
2. Relation to Uterine Wall.
3. Secondary Changes.
4. Complications and Associated Diseases.

1. **Structure.**—The **ordinary myoma** is composed of involuntary muscle and connective tissue—the same tissues that compose the uterine wall (Figs. 592, 593). The abnormal proliferation of the muscular tissue seems to be the primary pathological change, the supporting connective tissue following incidentally, hence myoma is a better designation than fibroid or fibromyoma.

The **adenomyoma** contains epithelial elements in the form of gland tubules **scattered irregularly** in the muscular tissue. These glands resemble the glands **of the endometrium and are often** surrounded or partly surrounded by a layer of endometrial stroma (Figs. 594, 595). The scattered islands of endometrial tissue exhibit the characteristic feature of the endometrium, that is, they menstruate. There being no exit for the menstrual blood, it accumulates in the closed glands, distending them. This blood accumulation in the closed gland tubes, is a striking feature of the adenomyoma wherever it occurs, whether in the middle of the uterine wall, or under the peritoneum, or in extrauterine situations. It is found even in related growths occurring in the ovary, constituting a principal feature of these "endometrial" ovarian cysts, which are also called "chocolate" cysts because of the color and consistency of their contents.

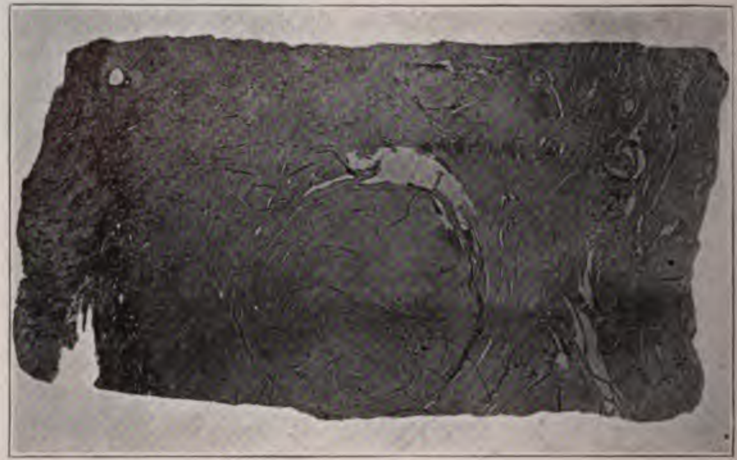


Fig. 592.—Photomicrograph of a small myoma, situated at about the middle of the uterine wall. The entire thickness of the wall is shown, the endometrium being at the left. The little tumor is distinctly encapsulated, and has shrunken somewhat from the adjacent tissue allowing the capsule to separate into layers. Notice the similarity in appearance of the tumor tissue and the tissue of the surrounding normal wall, due to the fact that they have the same elements and general structure. Gyn. Lab.

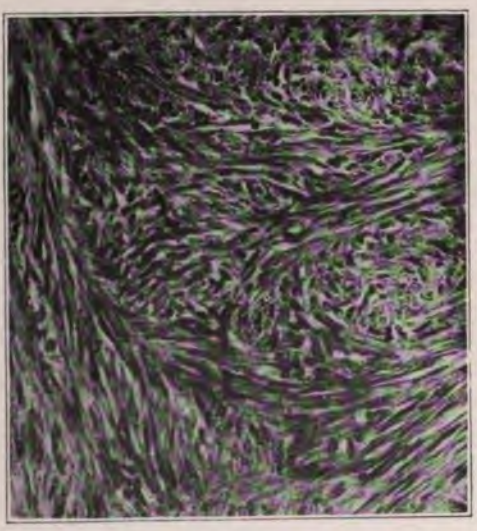
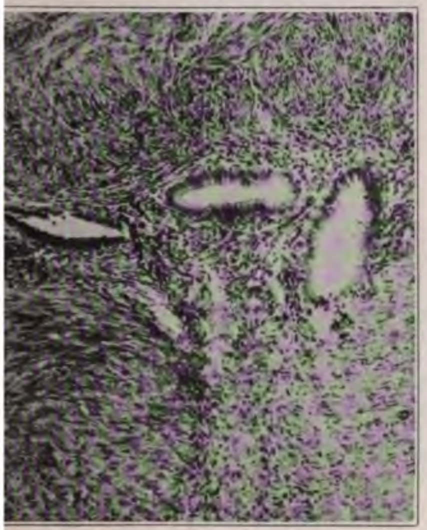


Fig. 593.—The structure of a myoma. High power, showing the muscle fibers extending in various directions. Gyn. Lab.

These scattered islands of endometrial tissue occurring in various structures and exhibiting a tendency to menstruation, form a most interesting problem in pathology and one that is still far from solution.

2. **Relation to Uterine Wall.**—The **ordinary** myoma is nearly always encapsulated. It starts as a small nodule in the muscular layer of uterine wall (Fig. 592). As it enlarges there usually develops a distinct capsule, or layer of condensed tissue, which separates the tumor proper from the norm



. 594.—Myoma showing typical glands—an myoma. The specimen consisted of a very subperitoneal nodule which was clipped off g the course of an abdominal operation with- isturbing the uterus itself.

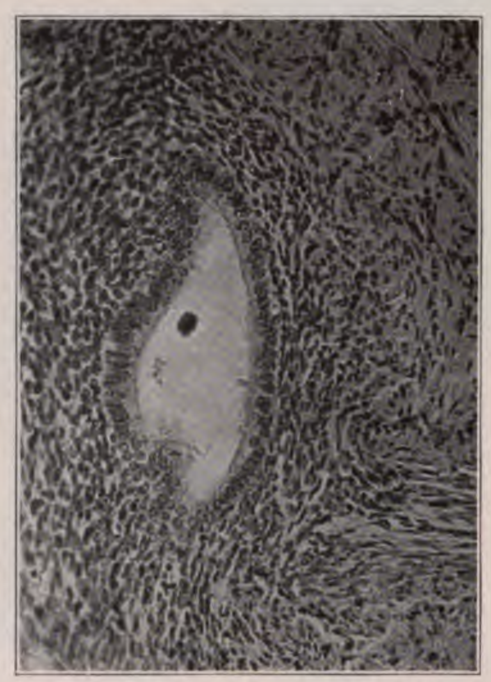


Fig. 595.—Gland from an adenomyoma, showing the surrounding layer of stroma.

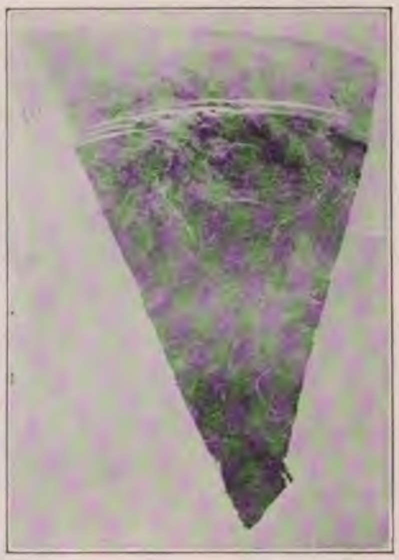
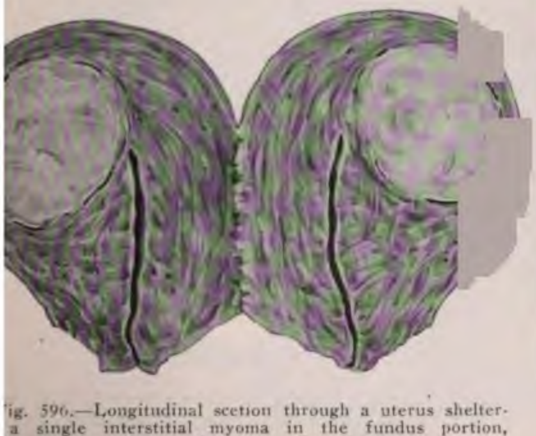


Fig. 597.—Showing the capsule of myoma. The layers of capsule have separated somewhat. Gyn. Lab.



ig. 596.—Longitudinal section through a uterus shelter- a single interstitial myoma in the fundus portion, ng uterine cavity undisturbed. Gyn. Lab.

l surrounding it (Figs. 596, 597, 598, 599). From this capsule it may be ily shelled out, except when there has been inflammatory infiltration of capsule and tumor.

the tumor is surrounded by the muscular tissue of the wall, it

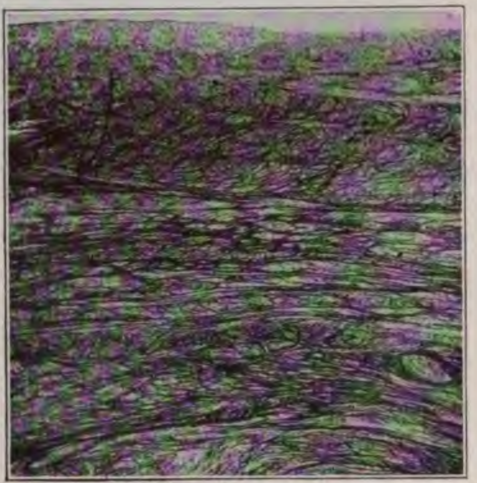


Fig. 598.—A view of an intact portion of the capsule in Fig. 597, under higher power. Notice the general longitudinal direction of the fiber bundles due to compression. Gyn. Lab.

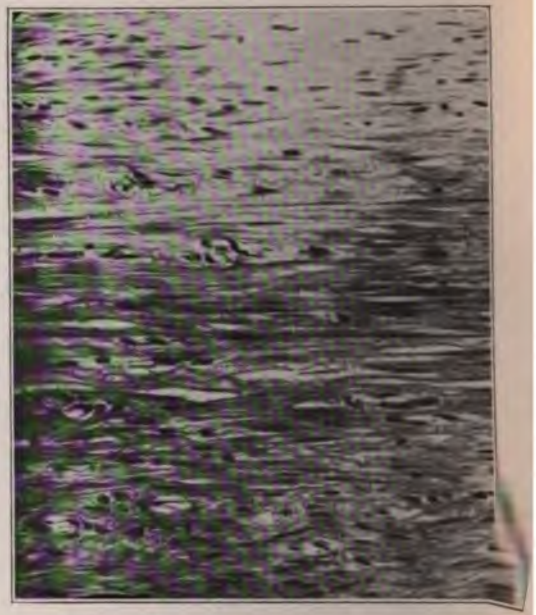


Fig. 599.—The same capsule, under still higher power, showing the general longitudinal direction of the individual fibers. Gyn. Lab.

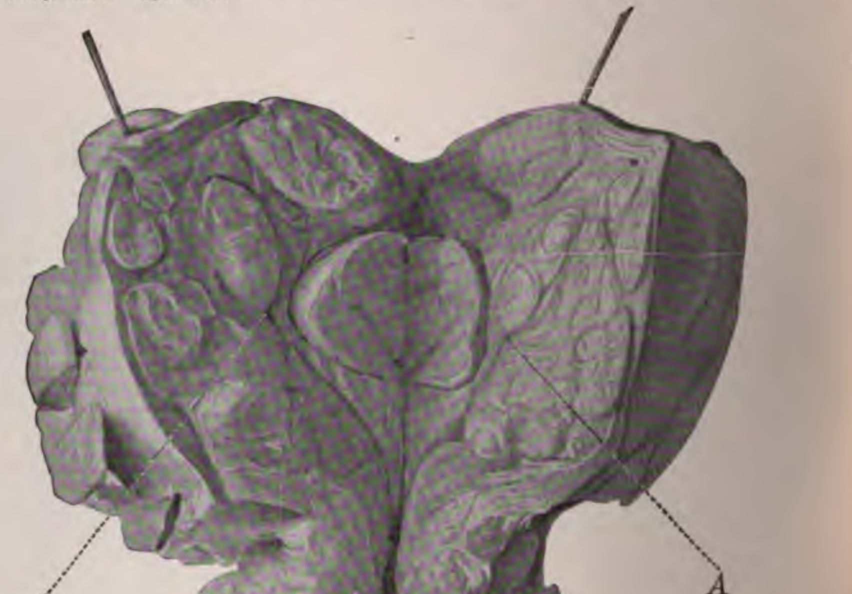


Fig. 600.—Multiple myomata of the uterus. *A.* The divided uterine cavity. (Bishop—*Uterine Fibromyomata.*)

is known as an intramural or **interstitial** or **intramural myoma** (Figs. 592, 596, 601 to 604). They comprise 60 to 70 per cent of the cases.

As the ordinary encapsulated tumor grows, it pushes in the ection of least resistance, stretching the muscular tissue around it and tending to push the muscular tissue aside. When it pushes aside the muscular tissue to the outer side of it and comes to lie just beneath the peritoneum, it is known as a subserous or **subperitoneal myoma** (Figs. 601, 605). They comprise 20 to 30 per cent of the cases.

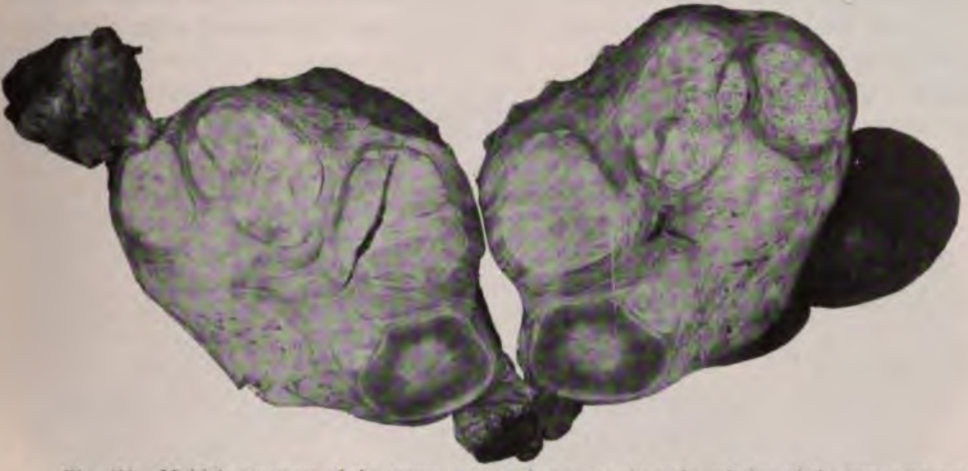


Fig. 601.—Multiple myomata of the uterus, sectioned so as to show the relation of the tumor-masses to the uterine wall. The encapsulation of the myoma nodules is well shown. To the extreme left is a subperitoneal myoma (not sectioned). The top of the uterine cavity is seen near the center of the left half of the sectioned mass.

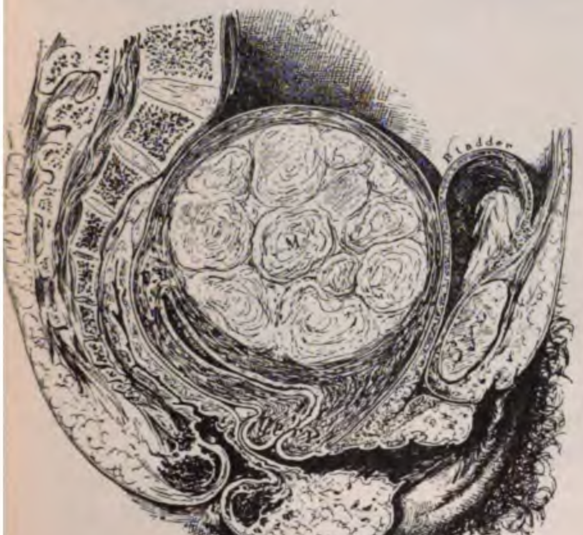


Fig. 602.—Single large myoma in anterior uterine wall, choking the pelvis. (Kelly—*Operative Gynecology*.)

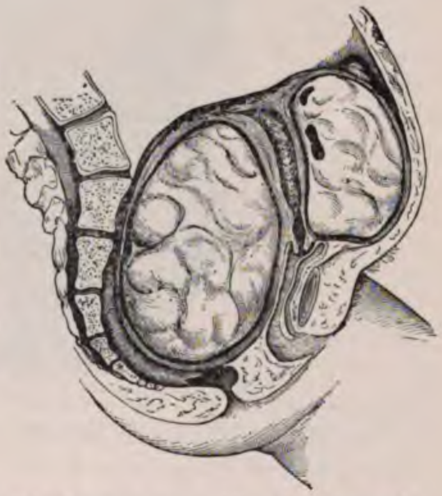


Fig. 603.—Large myomata, filling the pelvis and lower abdomen. (A. Martin—*Atlas of Gynecology*.)

This process of escape from the grasp of the muscular tissue may progress, the tumor projecting farther and farther beyond the outline of the but still covered by the peritoneum, until it is attached to the uterus tively narrow band of tissue, or pedicle, carrying the blood vessels and covered by peritoneum. It is then a **pediculated subperiton** **myoma** (Fig. 605).

In some cases adhesions to adjacent structures are formed, and thro these adhesions the tumor may receive part of its blood supply. Occasion the pedicle of such a tumor is severed by torsion or otherwise and the tu is thus entirely separated from the uterus and receives its blood sup through the vascular adhesions. Such a tumor is known as a detac

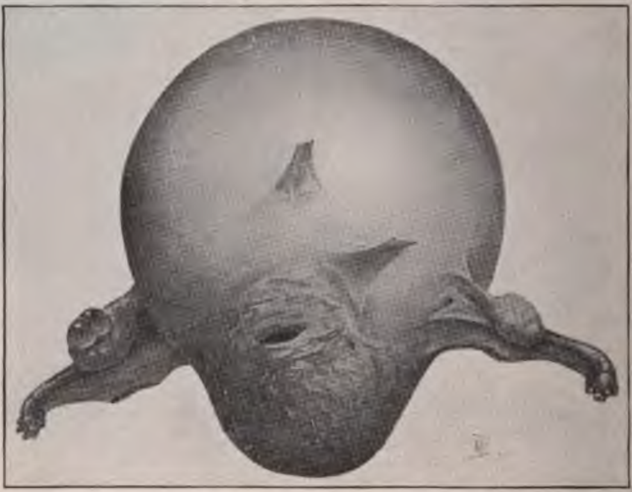


Fig. 604.—Uterus symmetrically enlarged from myomata. This might be mistaken for a pregnant ute on account of the close resemblance in shape. (Kelly—*Operative Gynecology.*)

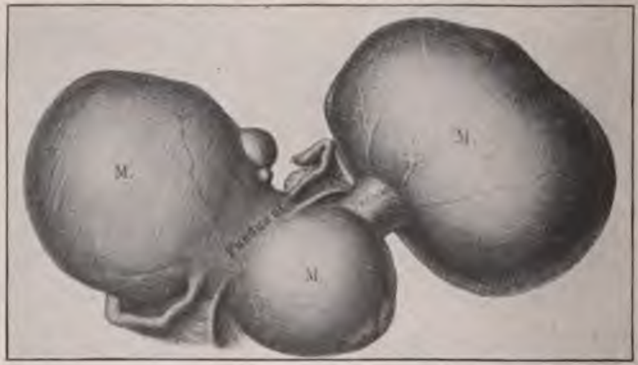


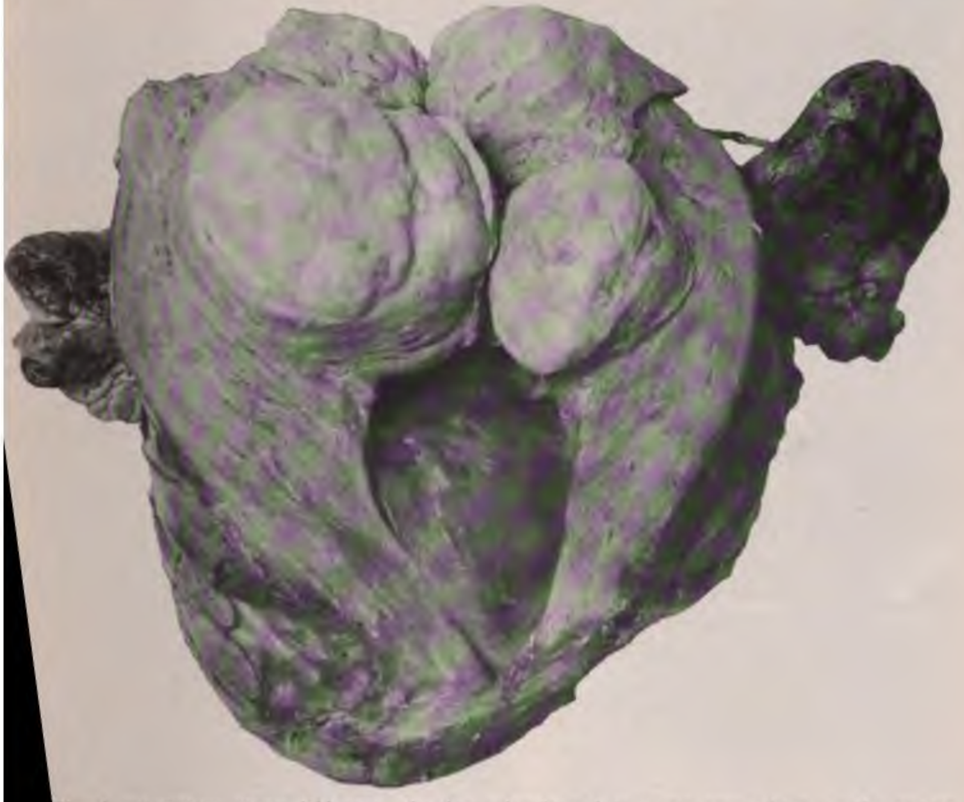
Fig. 605.—Subperitoneal myomata, showing the irregularity and distortion often present. (Kelly—*Operative Gynecology.*)

or "parasitic" or **wandering myoma,** and constitutes one of the curiositie pathology.

If a tumor which is escaping outward from the grasp of the musc wall is so situated that it projects into the broad ligament, it is known as **intraligamentary myoma.** If it projects in such a situation that it raises peritoneum behind the uterus and passes back of the peritoneum, it is th called a **retroperitoneal myoma.**

On the other hand, the myoma, as it develops, may push its way inward instead of outward, and may come in time to lie beneath the endometrium, where it is known as a **submucous myoma** (Figs. 606 to 609). Submucous **myomata** comprise about 10 to 15 per cent of the cases. The proximity of the growth to the endometrium causes, in the latter, changes due to pressure. The glandular portion is narrowed, the surface epithelium flattened and missing entirely in some areas (Fig 608).

The submucous myoma may project farther and farther into the uterine cavity, until it is attached to the wall only by a pedicle, constituting a **pediculated submucous myoma** (Figs. 636, 652). A pediculated submucous myoma



05.—A myomatous uterus laid open, showing subperitoneal myomata encroaching on the uterine cavity and distorting it. Gyn. Lab.

be forced out into the vagina while still attached to the uterine wall
610, 611) and may in this way cause partial or complete inversion of
erus (Fig. 653), a fact that must be kept in mind when removing such
th by operation.

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illustrations. In a certain proportion of cases the myoma is situated
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the cervical cavity is small. They are usually comparatively
imes reach a size of 8 pounds.

Adenomyoma.—In its relation to the uterine wall the adenomyoma differs radically from the ordinary encapsulated myoma. The adenomyoma is not encapsulated, as a rule, but penetrates the surrounding tissue in a way that makes separation very difficult. In the localized growths the margins fuse with the adjacent portions of the uterine wall, while some growths assume the form of a diffuse infiltration involving a smaller or larger part of the organ (Figs. 612, 618). Otherwise the adenomyomata bear the same relation to the wall as the ordinary encapsulated myoma, i. e., they are interstitial, subperitoneal, pediculated subperitoneal, wandering, submucous and pediculated submucous (Figs. 614, 615). They may occur also in various situations outside the uterus (Figs. 619 to 626).

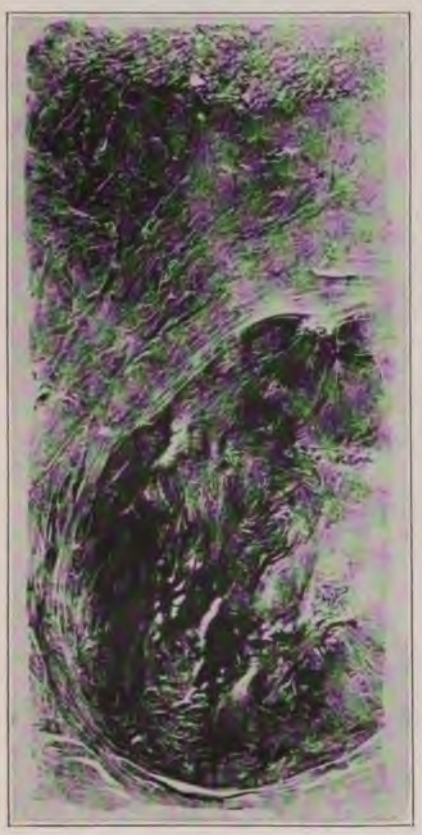


Fig. 607.—A very small encapsulated myoma near the endometrium. The endometrium is at the top and the myoma nodule occupies the lower half of the photomicrograph. Gyn. Lab.

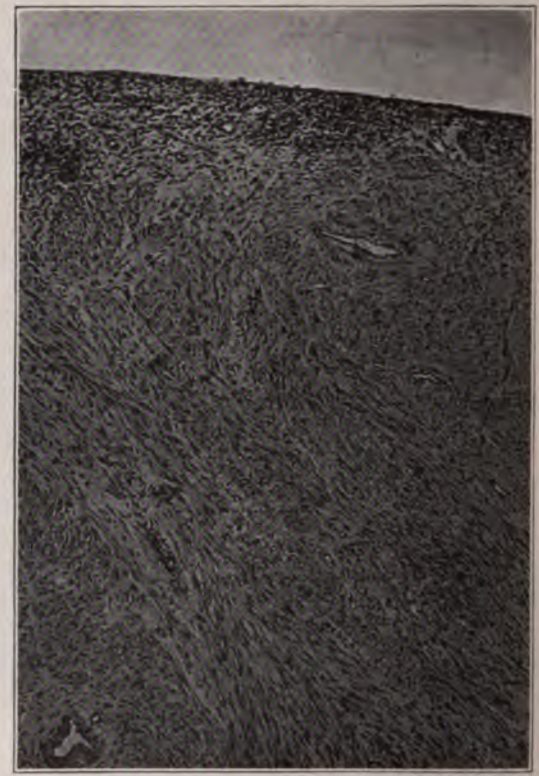


Fig. 608.—Compression of the endometrium by a submucous myoma encroaching on it. The thinned out endometrium is at the top of the picture. Gyn. Lab.

4. **Secondary Changes.**—Under composition is given the primary structure of the various forms of myoma. In many cases there are found secondary changes in the tumor structure. These changes are edema, myxomatous degeneration, necrobiosis, necrosis, suppuration, cystic degeneration, calcification, malignant degeneration and other rarer changes (atrophy, fatty degeneration, amyloid degeneration). The relative frequency with which the more

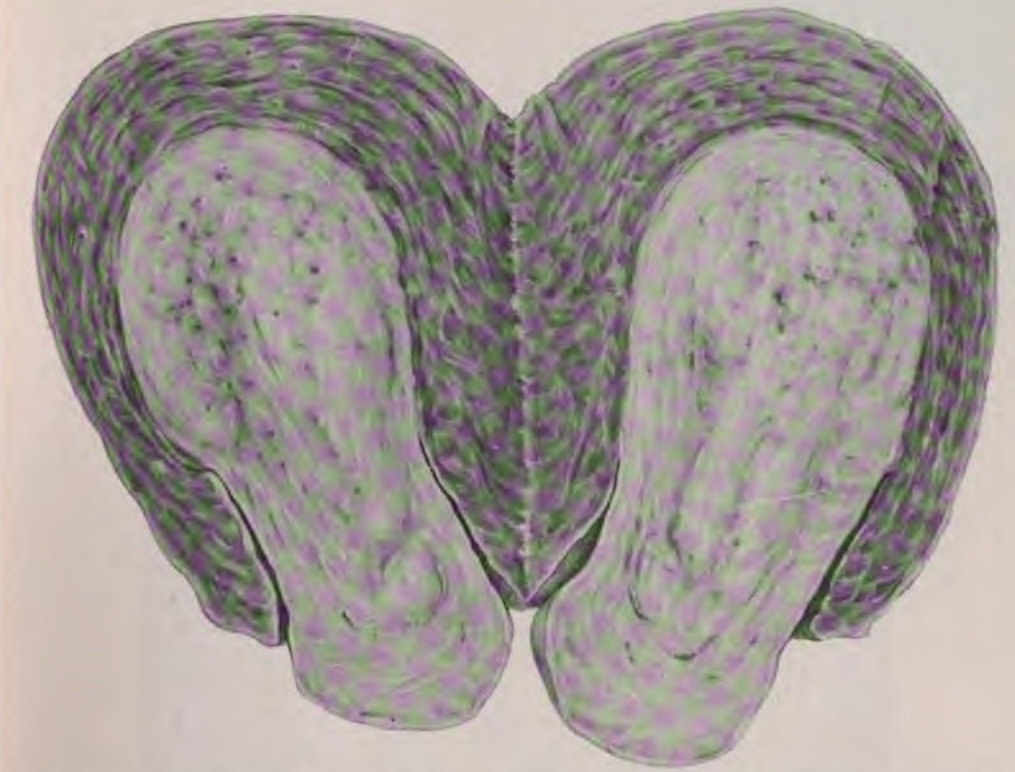


Fig. 609.—Large submucous myoma filling the uterine cavity and partially protruding into the vagina through the dilated cervix.

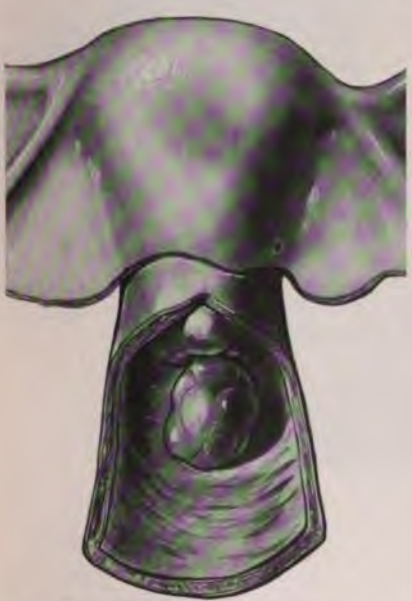


Fig. 610.—A small pediculated myoma of uterus, projecting into the vagina. (Montgomery—*Practical Gynecology.*)

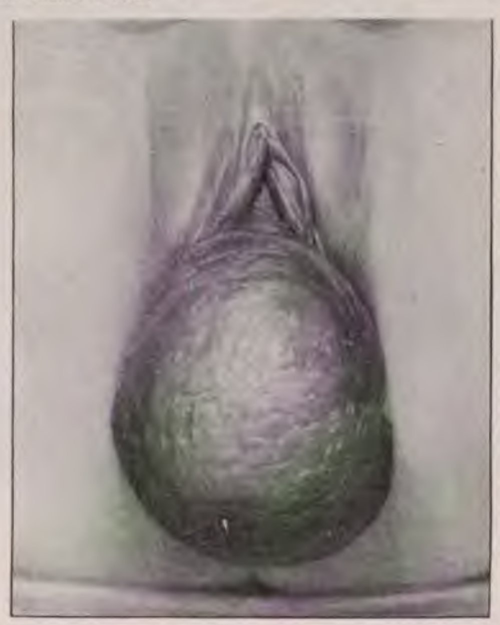


Fig. 611.—A large pediculated myoma of uterus, projecting outside the vagina. (Kelly—*Operative Gynecology.*)

important of these secondary changes has been noted in operated cases, is shown in an analysis of 1815 reported cases, consisting of nine series of consecutive cases (Noble collection 1118, Watt-Keen, from Hofmeiers Clinic, 417, Webster 210). This analysis showed necrosis in the tumor in 4.7 per cent, suppuration in tumor in 5 per cent, myxomatous degeneration in 3 per cent, decided cystic changes in 2.9 per cent, calcareous deposits in 1.9 per cent and malignant disease of the tumor or corpus uteri in 3.6 per cent.

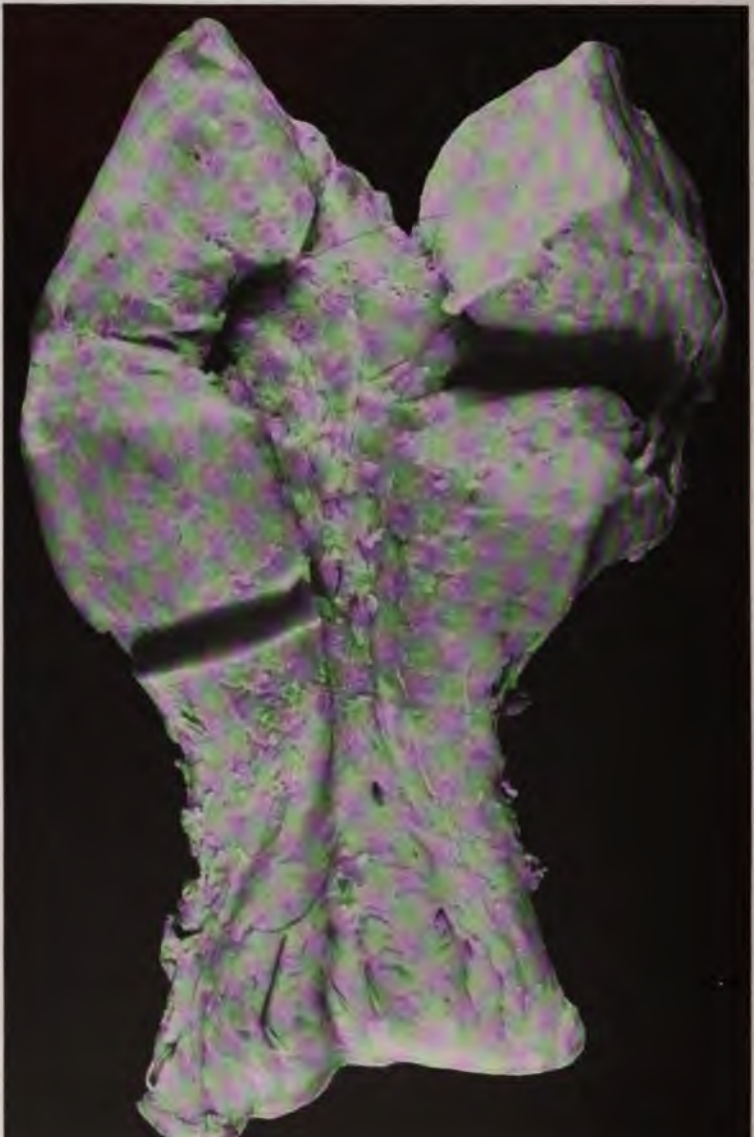


Fig. 612.—Diffuse adenomyoma of uterus, gross specimen. The entire uterus shows thickening of the walls due to a coarse adenomyomatous growth, as shown in Fig. 613.

Hyaline degeneration is shown in Fig. 627 and an extensive white necrobiotic change in Fig. 628. There is also an interesting necrobiotic change known as "red degeneration." In this the nutrition of the tumor is so interfered with that there is a breaking up and general diffusion of the blood coloring, giving a red appearance, but the process may be stopped short of necrosis, and a partial restoration of tumor vitality take place. It is seen in pregnancy with myoma and in other complications interfering with the circulation of the tumor. Localized areas of it are seen frequently. Fig. 601

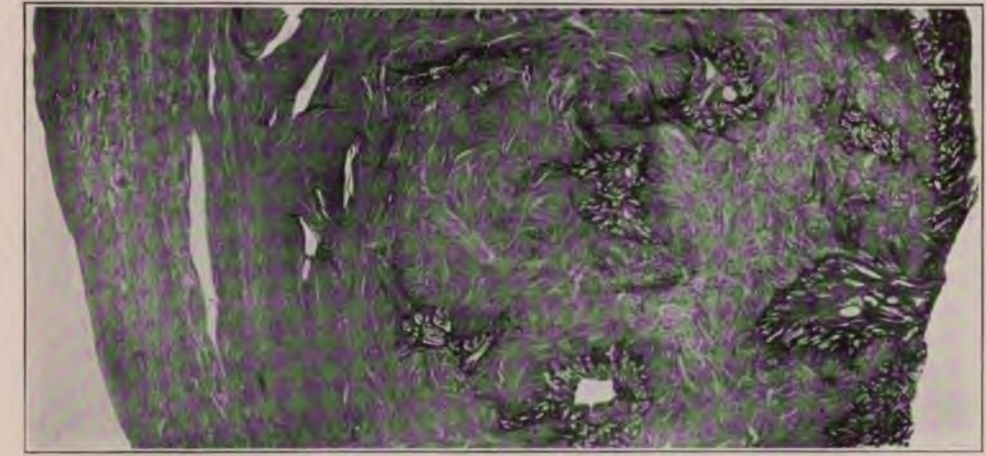


Fig. 613.—Section of the wall of specimen shown in Fig. 612. Notice the large gland areas extending through two-thirds of the wall. There is a peculiar coarseness of detail in these areas that causes the photomicrograph to resemble a drawing. Gyn. Lab.

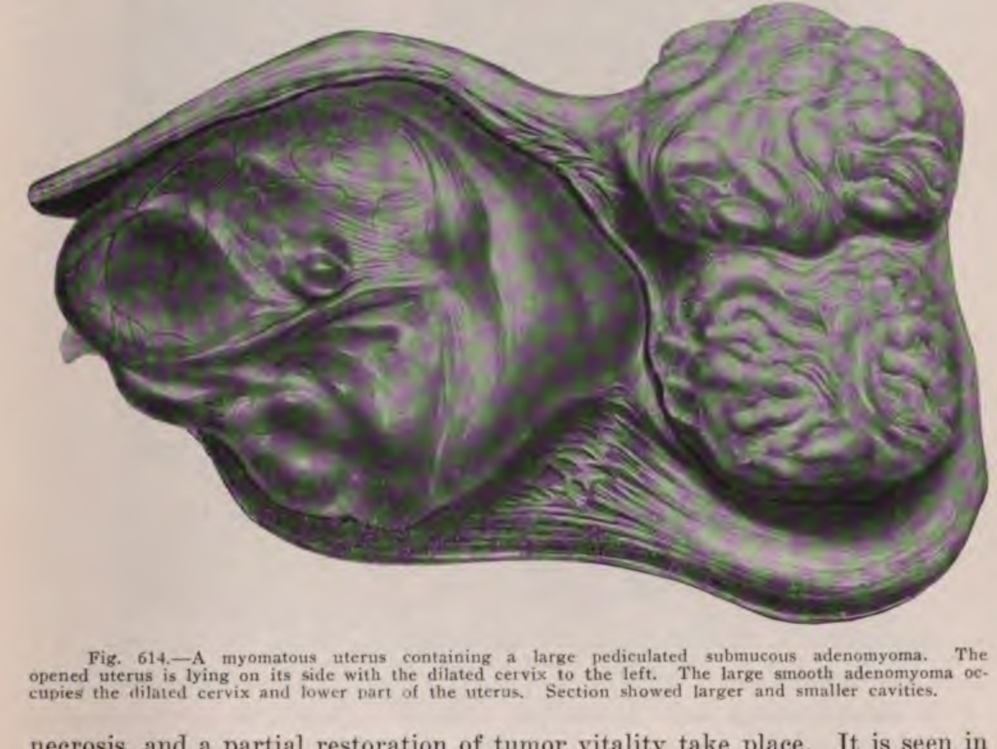


Fig. 614.—A myomatous uterus containing a large pediculated submucous adenomyoma. The opened uterus is lying on its side with the dilated cervix to the left. The large smooth adenomyoma occupies the dilated cervix and lower part of the uterus. Section showed larger and smaller cavities.

shows a small tumor which has undergone this change. Fig. 629 shows a beautiful example of red degeneration involving the whole of a large myoma. Cystic changes are shown in Figs. 630 and 631, and necrosis and suppuration in myomata in Figs. 632 to 636. Sarcomatous development is shown in Figs. 637 to 641.

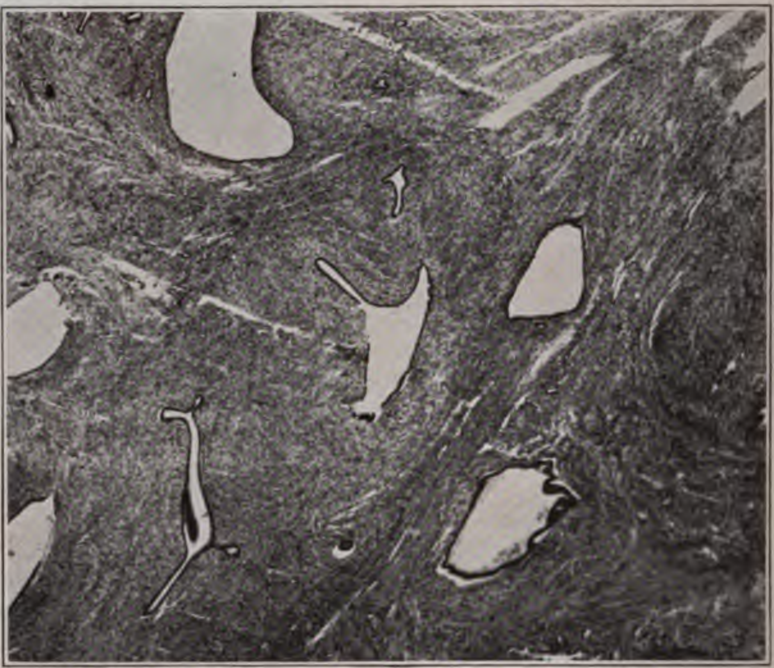


Fig. 615.—Section from the large pediculated adenomyoma shown in Fig. 614, showing the microscopic structure of the more compact portions. Notice the dilated glands. Gyn. Lab.

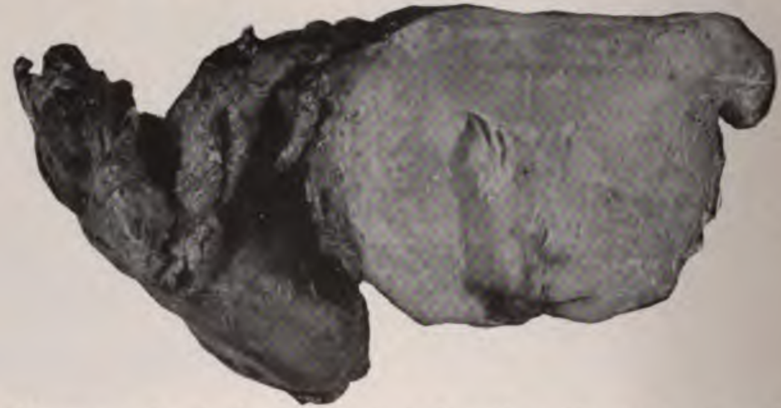


Fig. 616.—Adenomyoma of uterine horn. Uterus is cut from side to side, posterior view. The stub at the right is an adenomyoma. Gyn. Lab.

5. **Complications and Associated Diseases.**—These are very numerous and very important, for a large proportion of the deaths and of the suffering in myoma cases comes from them. Some of these conditions are due directly to the myoma, some are due indirectly to it and some have no etiologic connection

with the myoma, but are only associated affections. Some of them cannot be assigned exclusively to one group or the other, therefore, all of them will be considered together. For convenience they are divided into three classes according to locality—(a) in the uterus, (b) in adjacent structures and (c) in distant organs.

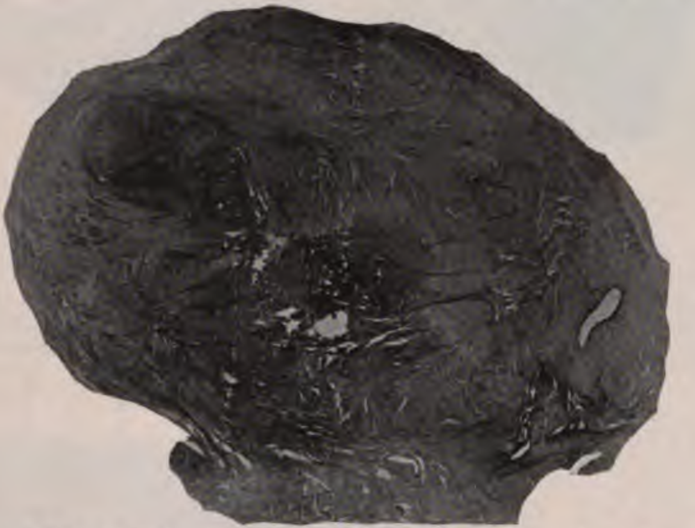


Fig. 617.—Section of the knob-like projection at the right horn of the specimen shown in Fig. 616. Notice the glands scattered through the myomatous tissue. Gyn. Lab.

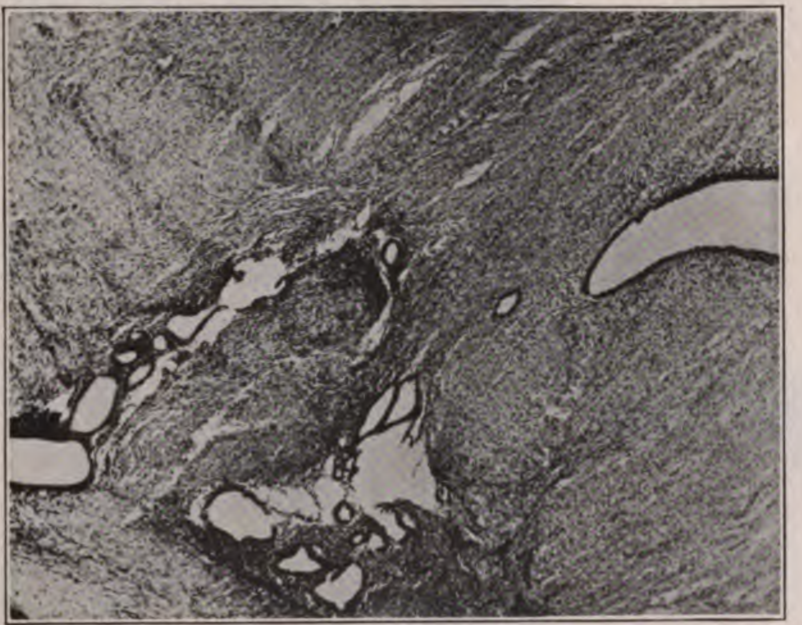


Fig. 618.—High power of Fig. 617, taking in an area at the lower right portion including the tip of the horn-shaped dilated gland. Gyn. Lab.

a. In the uterus is found thickening of the endometrium, distortion of

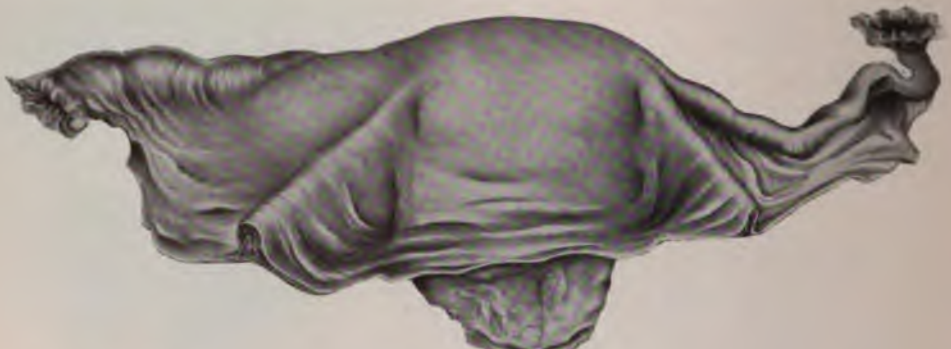


Fig. 619.—Adenomyoma of right broad ligament. When the abdomen was opened a small mass was found in the right broad ligament between the tube and round ligament and near the fundus uteri, as indicated by the slight bulging in the drawing. In the course of the operative work the small mass was removed, but with considerable difficulty, as it was not encapsulated and was adherent to the surrounding structures. It was connected to the uterus by a fibrous cord. On section it contained blood and the cord connecting it with the uterine wall had a small canal as indicated in Fig. 620. Gyn. Lab.

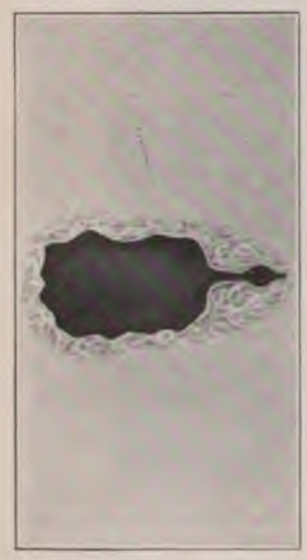


Fig. 620.—Diagrammatic representation of the small broad ligament mass shown in Fig. 619. The black area indicates the cavity which was filled with old blood. Gyn. Lab.

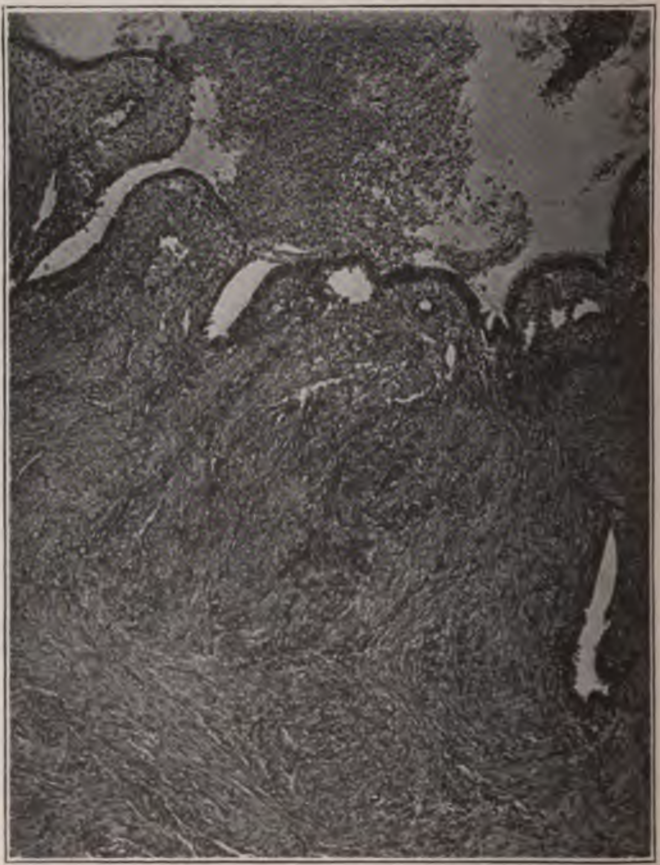
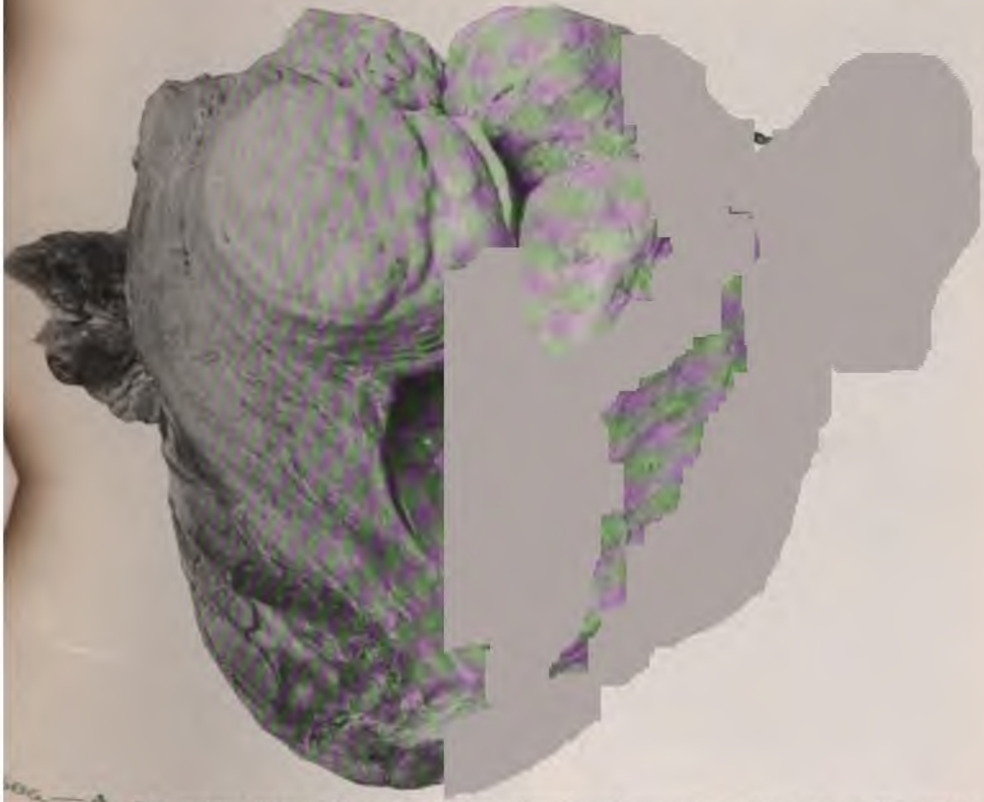


Fig. 621.—Section from the wall of the cavity (Fig. 620), showing the blood in the cavity, the lining cells, the included glands and the muscular tissue. Gyn. Lab.

On the other hand, the myoma, as it develops, may push its way inward stead of outward, and may come in time to lie beneath the endometrium, here it is known as a **submucous myoma** (Figs. 606 to 609). Submucous yomata comprise about 10 to 15 per cent of the cases. The proximity of the growth to the endometrium causes, in the latter, changes due to pressure. The glandular portion is narrowed, the surface epithelium flattened and missing entirely in some areas (Fig 608).

The submucous myoma may project farther and farther into the uterine cavity, until it is attached to the wall only by a pedicle, constituting a **pediculated submucous myoma** (Figs. 636, 652). A pediculated submucous myoma



606.—A myomatous uterus laid open, showing subperitoneal myomata encroaching on the uterine cavity and distorting it. Gyn. Lab.

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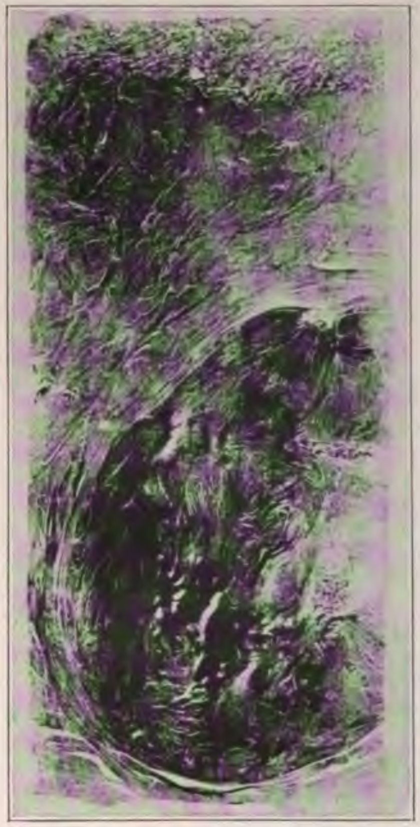

Fig. 607.—A very small encapsulated myoma near the endometrium. The endometrium is at the top and the myoma nodule occupies the lower half of the photomicrograph. Gyn. Lab.

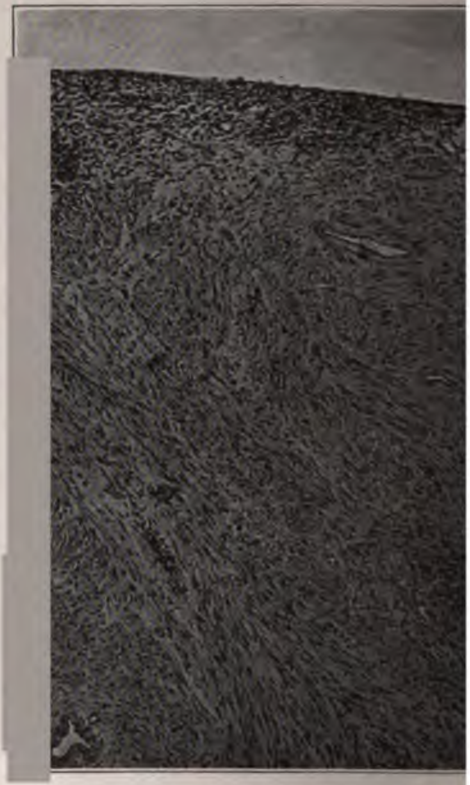

Fig. 608.—Compression of the endometrium by mucous myoma encroaching on it. The thinn endometrium is at the top of the picture. Gyn.

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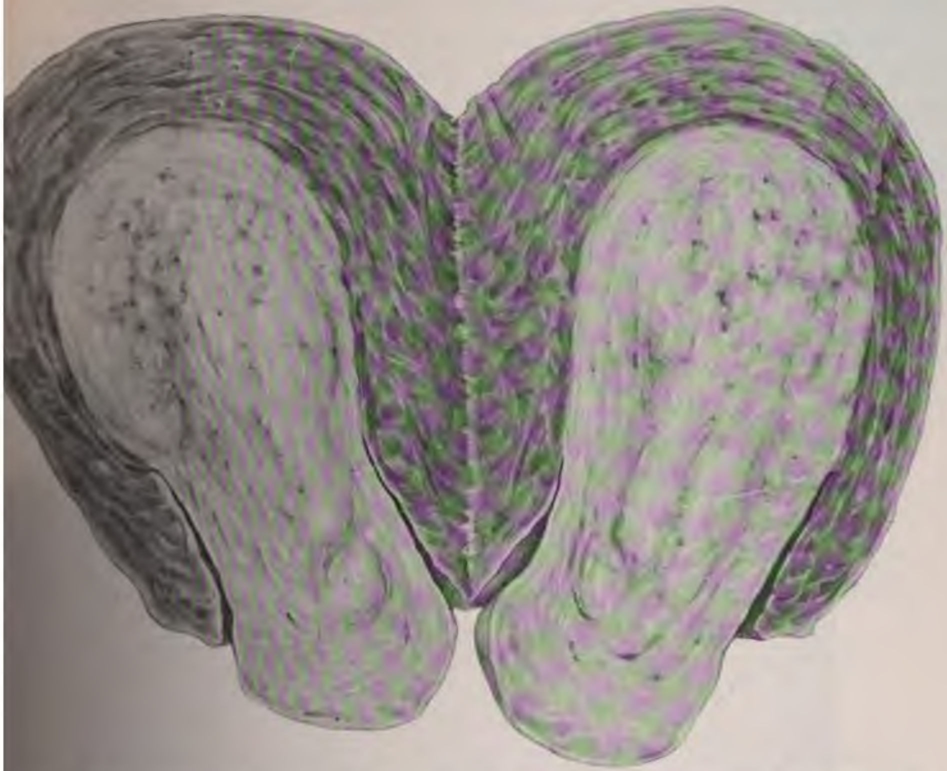

609.—Large submucous myoma filling the uterine cavity and partially protruding into the vagina through the dilated cervix.

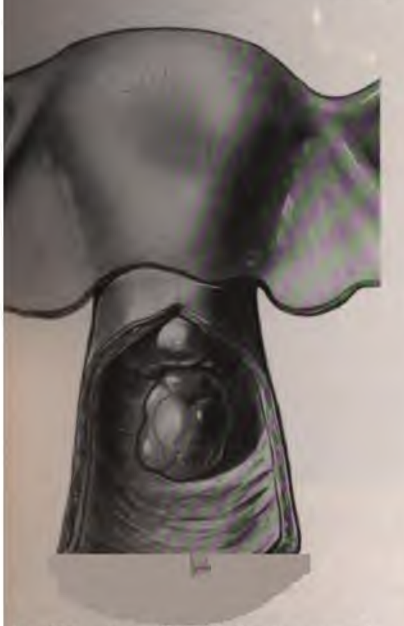

Fig. 610.—A small pediculated myoma of erus, projecting into the vagina. (Mont- ery—*Practical Gynecology.*)

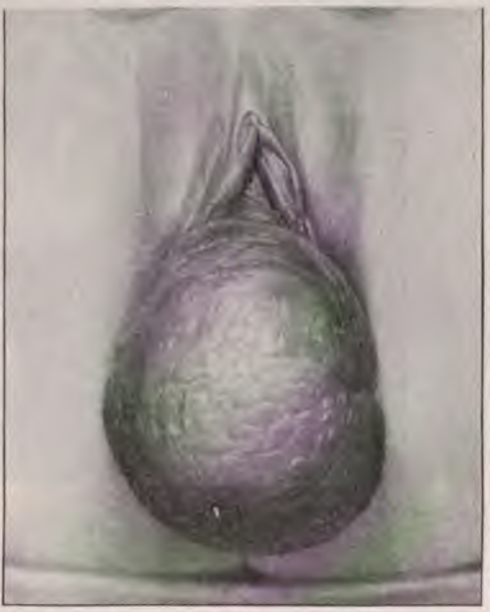

Fig. 611.—A large pediculated myoma of uterus, projecting outside the vagina. (Kelly—*Operative Gynecology.*)

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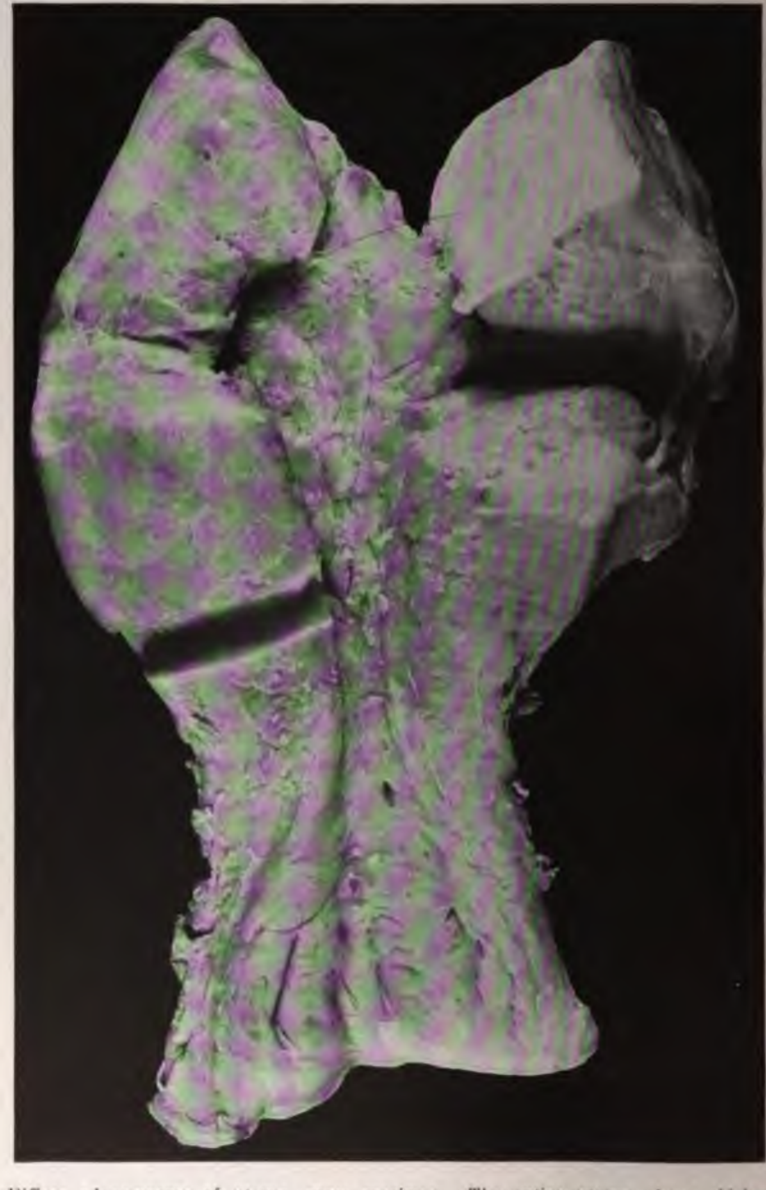


Fig. 612.—Diffuse adenomyoma of uterus, gross specimen. The entire uterus shows thickening walls due to a coarse adenomyomatous growth, as shown in Fig. 613.

suppuration in tumor in 5 per cent, myxomatous degeneration in 3 per decided cystic changes in 2.9 per cent, calcareous deposits in 1.9 per cent malignant disease of the tumor or corpus uteri in 3.6 per cent.

Hyaline degeneration is shown in Fig. 627 and an extensive white n otic change in Fig. 628. There is also an interesting necrobiotic change nown as "red degeneration." In this the nutrition of the tumor is so inter-red with that there is a breaking up and general diffusion of the blood oloring, giving a red appearance, but the process may be stopped short of

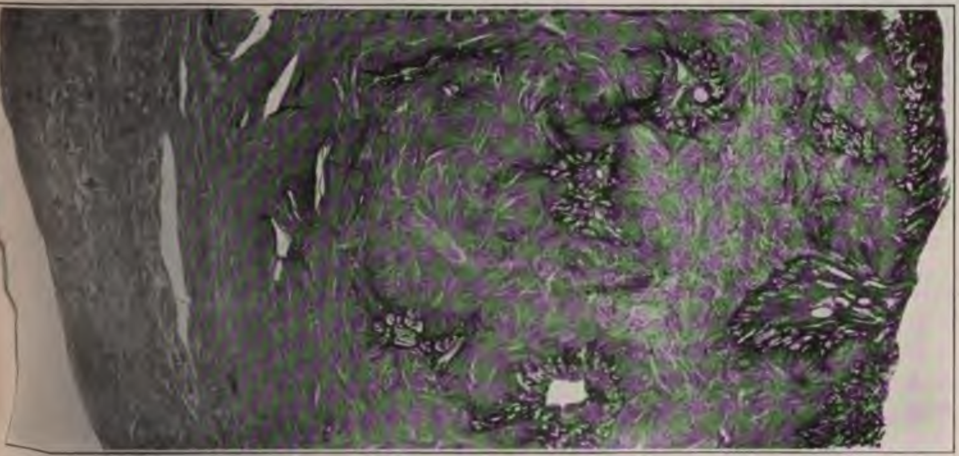


Fig. 613.—Section of the wall of specimen shown in Fig. 612. Notice the large gland areas extending through two-thirds of the wall. There is a peculiar coarseness of detail in these areas that causes the photomicrograph to resemble a drawing. Gyn. Lab.

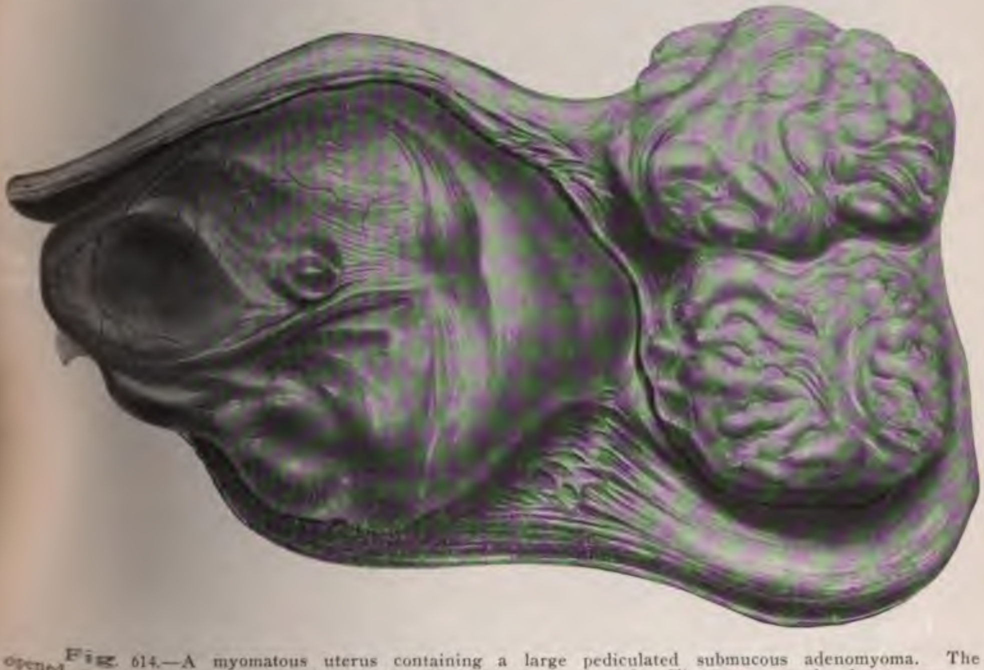
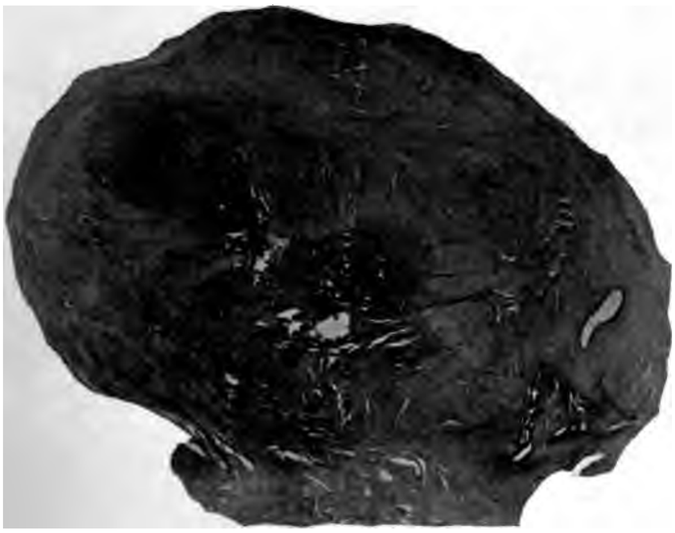


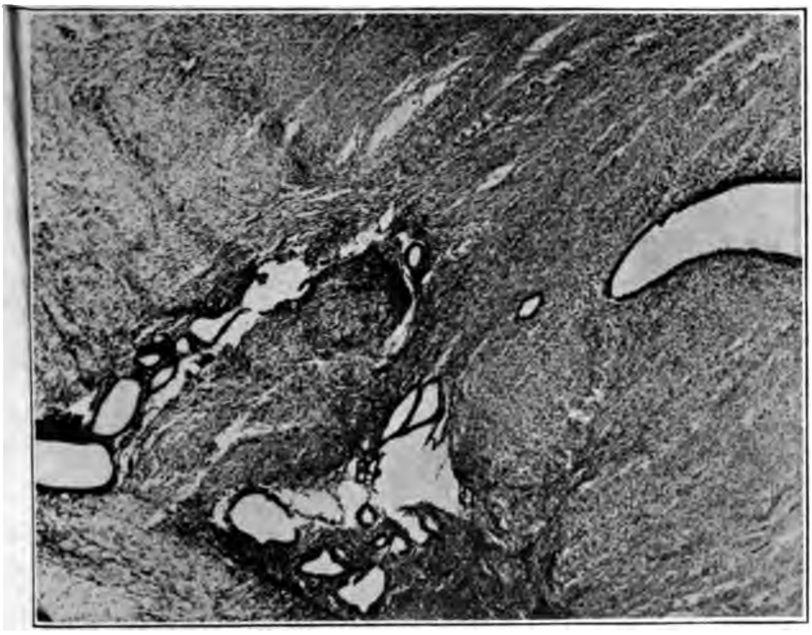
Fig. 614.—A myomatous uterus containing a large pediculated submucous adenomyoma. The opened uterus is lying on its side with the dilated cervix to the left. The large smooth adenomyoma occupies the dilated cervix and lower part of the uterus. Section showed larger and smaller cavities.

necrosis, and a partial restoration of tumor vitality take place. It is seen in pregnancy with myoma and in other complications interfering with the circulation of the tumor. Localized areas of it are seen frequently. Fig. 601

ith the myoma, but are only associated affections. Some of them cannot be signed exclusively to one group or the other, therefore, all of them will be nsidered together. For convenience they are divided into three classes ac-



7.—Section of the knob-like projection at the right horn of the specimen shown in Fig. 616. Notice the glands scattered through the myomatous tissue. Gyn. Lab.



g. 618.—High power of Fig. 617, taking in an area at the lower right portion including the tip of the horn-shaped dilated gland. Gyn. Lab.

cording to locality—(a) in the uterus, (b) in adjacent structures and (c) in distant organs.

a. In the uterus is found thickening of the endometrium, distortion of

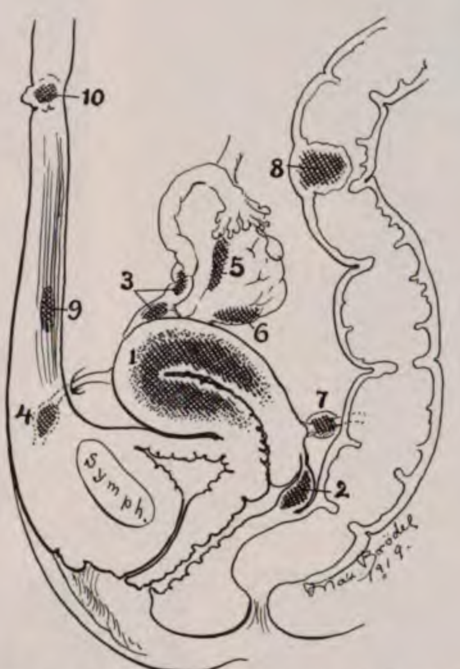


Fig. 622.—Sites at which adenomyomata have been found. 1, Uterus; 2, rectovaginal septum; 3, tube; 4, round ligament; 5, ovary; 6, utero-ovarian ligament; 7, uterosacral ligament; 8, sigmoid flexure; 9, rectus muscle; 10, umbilicus. (Cullen—*Archives of Surgery.*)

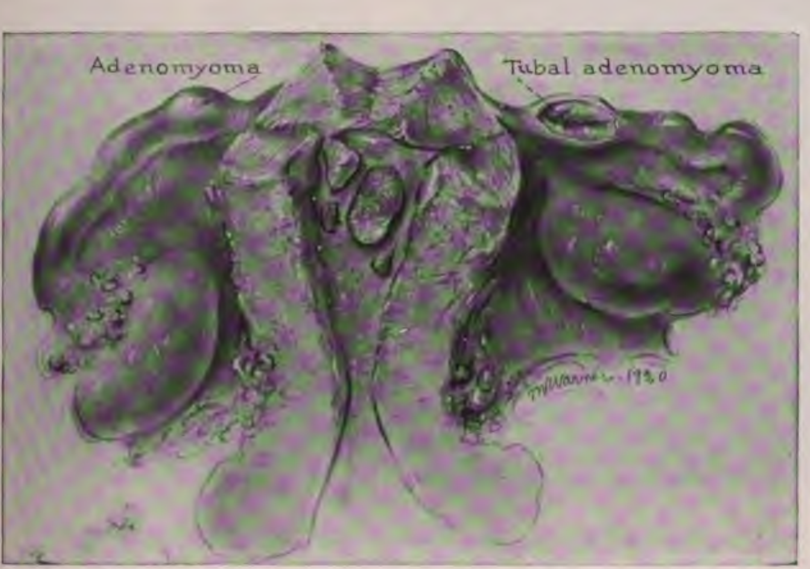
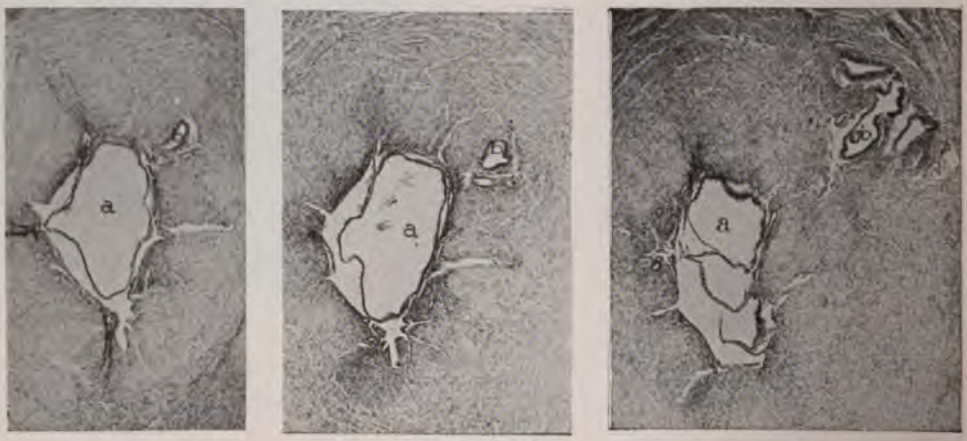
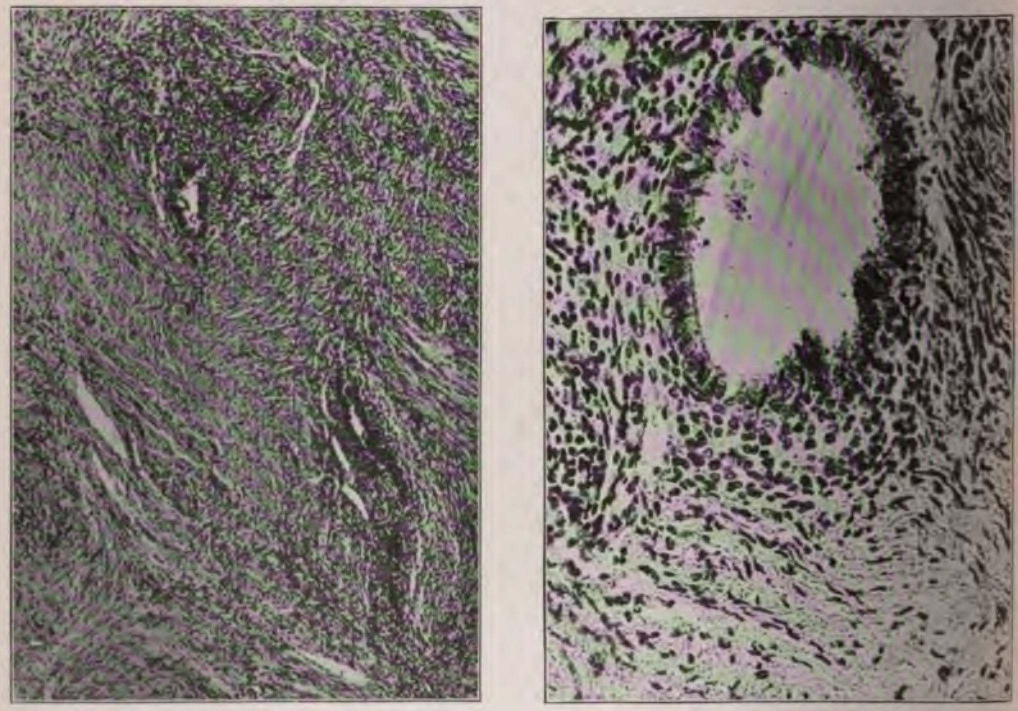


Fig. 623.—Adenomyomata of the fallopian tubes. (Mahle—*Surg., Gyn. and Obst.*)



A. B. C.

Fig. 624.—Demonstrating origin of a tubal adenomyoma from the tubal mucosa by serial sections. *A, B, C,* Rather widely separated sections, showing the gland at different stages of outward growth. (Mahle—*Surg., Gyn. and Obst.*)



A. B.

Fig. 625.—Adenomyoma of rectovaginal septum. The tumor was a small nodule about 1 cm. in diameter and was removed by vaginal incision. *A,* Shows smooth muscle in which are imbedded glands surrounded by a definite mantle of stroma. *B,* High power of same, showing gland with surrounding stroma and muscle. Gyn. Lab. (Schwarz—*Trans. Am. Assoc. Obst. and Gyn.*)

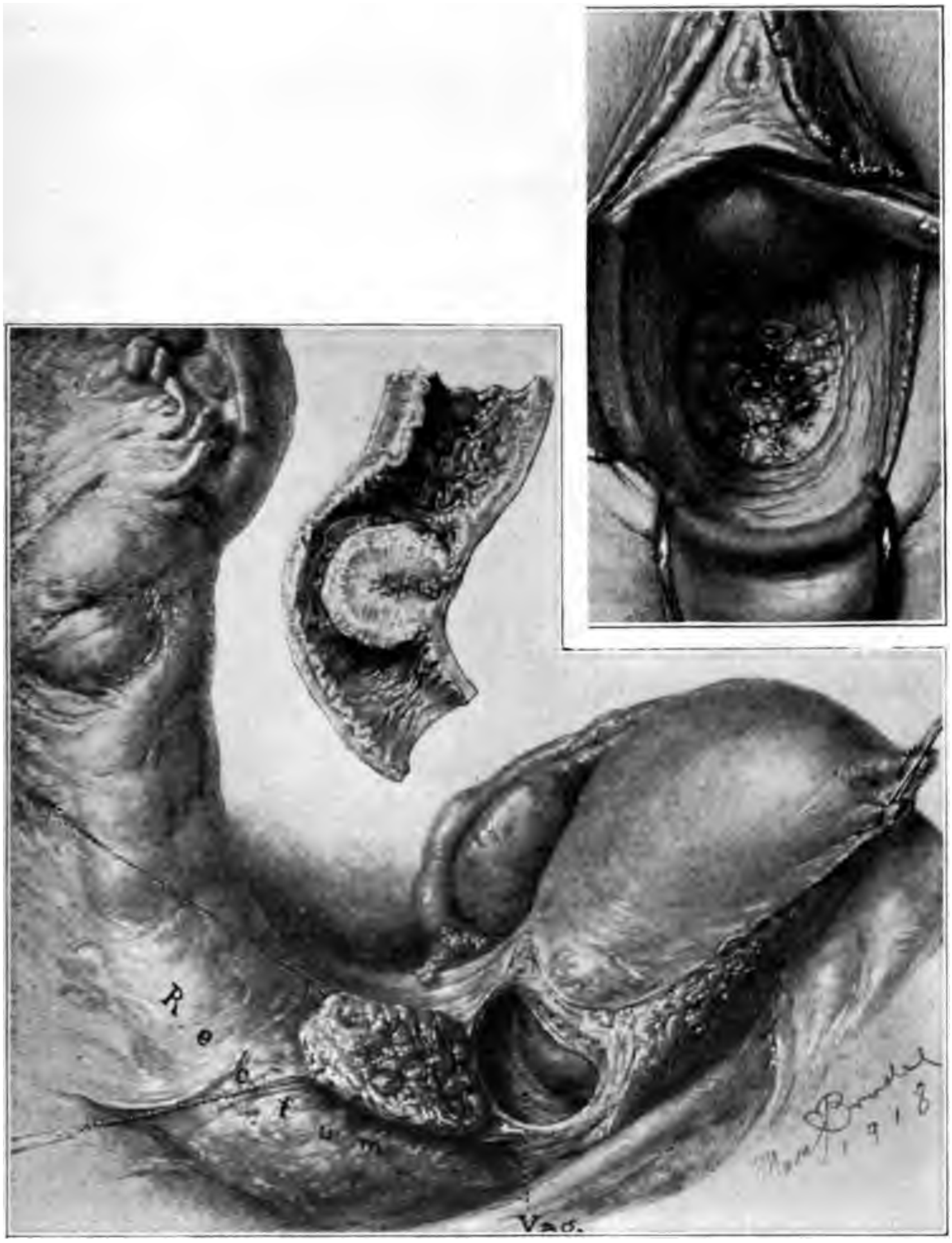


Fig. 626.—Adenomyoma of rectovaginal septum, with coincident adenomyoma of the sigmoid flexure which almost completely blocked the bowel. The insert at the upper right corner gives an excellent reproduction of the appearance through the vaginal speculum. (Cullen—*Archives of Surgery.*)

the uterine cavity, with atrophy of the endometrium at pressure points, and displacements of the uterus from tumor growths. Carcinoma is an important associated disease that must be kept in mind and searched for. It may be present in the cervix (Fig. 642) or in the corpus uteri (Fig. 643). Pregnancy also is a rather frequent complication of myoma, either as an early pregnancy with a large tumor or as a more advanced pregnancy associated with a small tumor (Figs. 644, 645).

b. Under changes in adjacent structures come salpingitis, hydrosalpinx and pyosalpinx. Also, compression of the ovaries and inflammation of the same. There may be troublesome pressure on the bladder or ureters or pelvic vessels or rectum.

Adhesions to various important organs in the pelvis and lower abdomen constitute an important form of complication frequently found in myoma cases. The adhesions formed by adenomyomata are particularly serious as these growths tend to infiltrate and fuse with adjacent structures. Adhesions thus formed with the rectum, bladder and intestinal loops are very difficult of separation and constitute a serious menace in the operative treatment of adenomyomata (Fig. 646). This same tendency to serious infiltration of adjacent structures is seen in those related growths in the ovary—the endometrial or "chocolate" cysts (see Chapter XII).

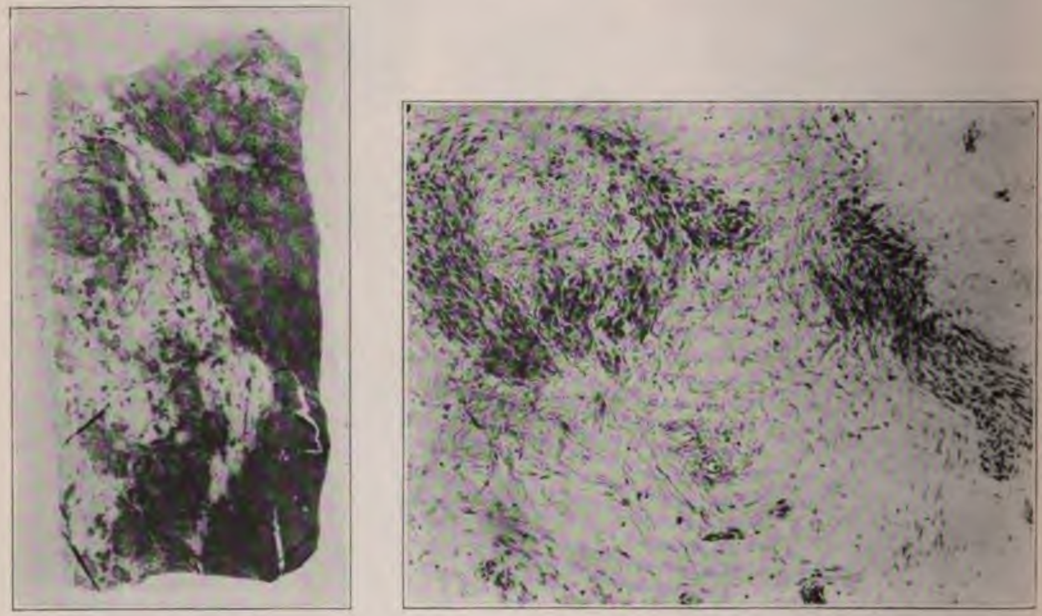

A. *B.*

Fig. 627.—Hyaline degeneration in a myoma. *A*, Low power. *B*, High power.

c. The changes in distant organs concern principally the heart and the kidneys. These changes are often serious. They are mentioned at some length below, in considering the various dangers from long-standing fibroids. The frequent association of heart disturbance with advanced uterine fibroid,

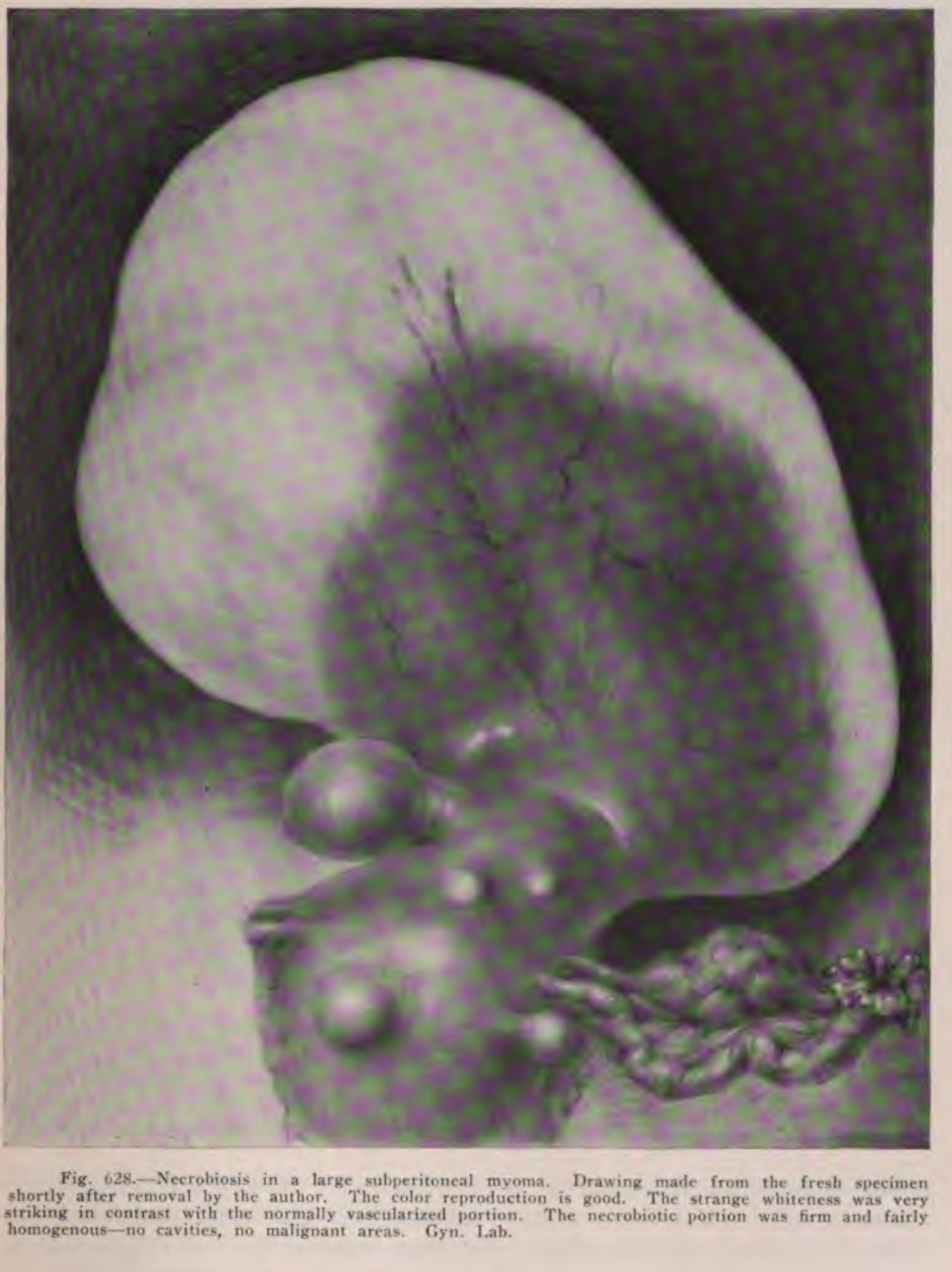


Fig. 628.—Necrobiosis in a large subperitoneal myoma. Drawing made from the fresh specimen shortly after removal by the author. The color reproduction is good. The strange whiteness was very striking in contrast with the normally vascularized portion. The necrobiotic portion was firm and fairly homogenous—no cavities, no malignant areas. Gyn. Lab.

has attracted much attention. The proportion of cases showing heart disturbance is striking. Winter had 266 consecutive cases examined for heart diseases and found heart disturbance in forty per cent. In five series carefully examined (Winter 266, Strassmann and Lehmann 71, Boldt 79, Fleck 325, Webster 210), the number showing heart disturbance varied from 25 to 47 per cent, averaging 38 per cent for the whole 951 cases. Of course, a certain number of these heart disturbances would have been found in any series of patients. But making due allowance for these the number is too marked and constant to be a mere coincidence. The exact connection between the two has not been worked out. But whether the heart disturbances are due principally to the chronic anemia from hemorrhage or to the direct action of some toxin produced in the myoma, or constitute simply an associated product of the same conditions that produced the myoma—what-

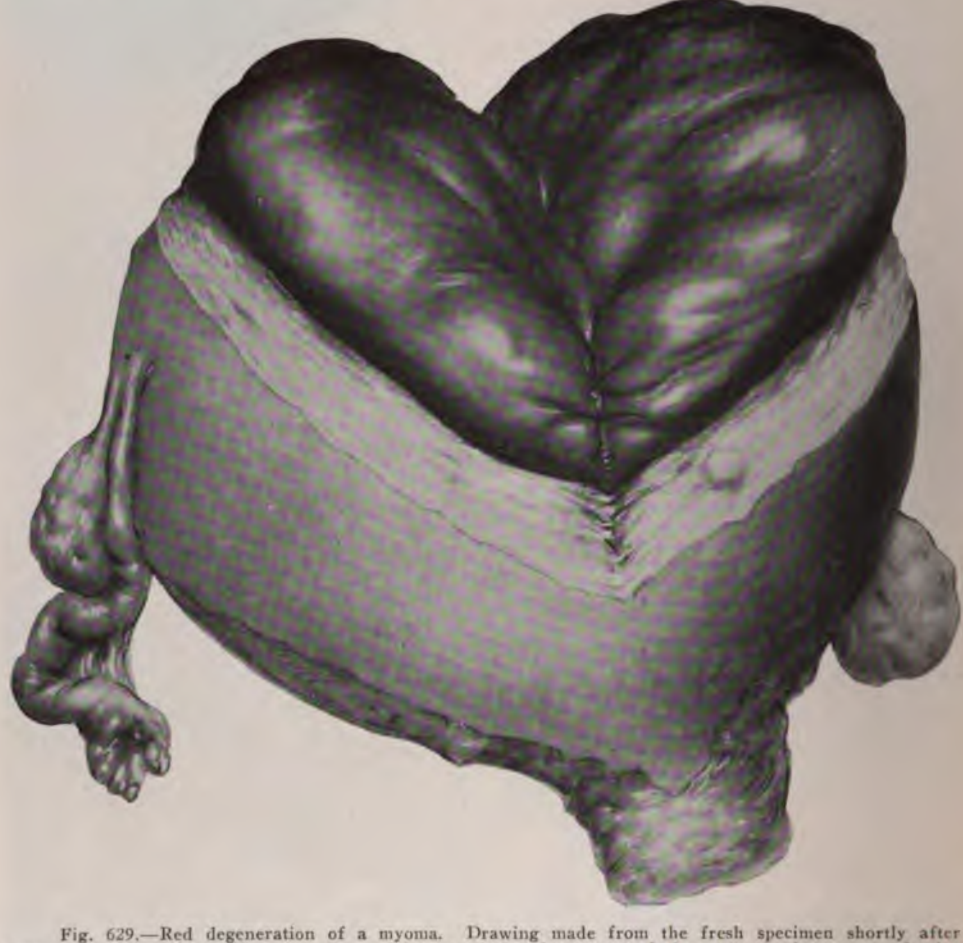


Fig. 629.—Red degeneration of a myoma. Drawing made from the fresh specimen shortly after removal by the author. The tumor caused symmetrical enlargement of the uterus and was so soft that it gave perfect fluctuation. Examined after the abdomen was opened the organ felt exactly like a pregnant uterus. The color of the peritoneal surface of the uterus had not the usual blush tinge of pregnancy, and the record of persistent bleeding ruled out a normal pregnancy. Incision of the uterus revealed the condition shown above. The large, dark red mass was soft and edematous and much too large for the confining capsule of muscle wall. Notice how it bulges and rolls out over the sides. Gyn. Lab.

ever the cause—the fact remains that they are there and must be reckoned with.

Some of these are minor functional disturbances but on the other hand many are of serious import. That such is the case is shown by Baldy from the records of the Gynecian Hospital. In the series of 3,413 operations, sudden postoperative death due to circulatory disturbance occurred 16 times.

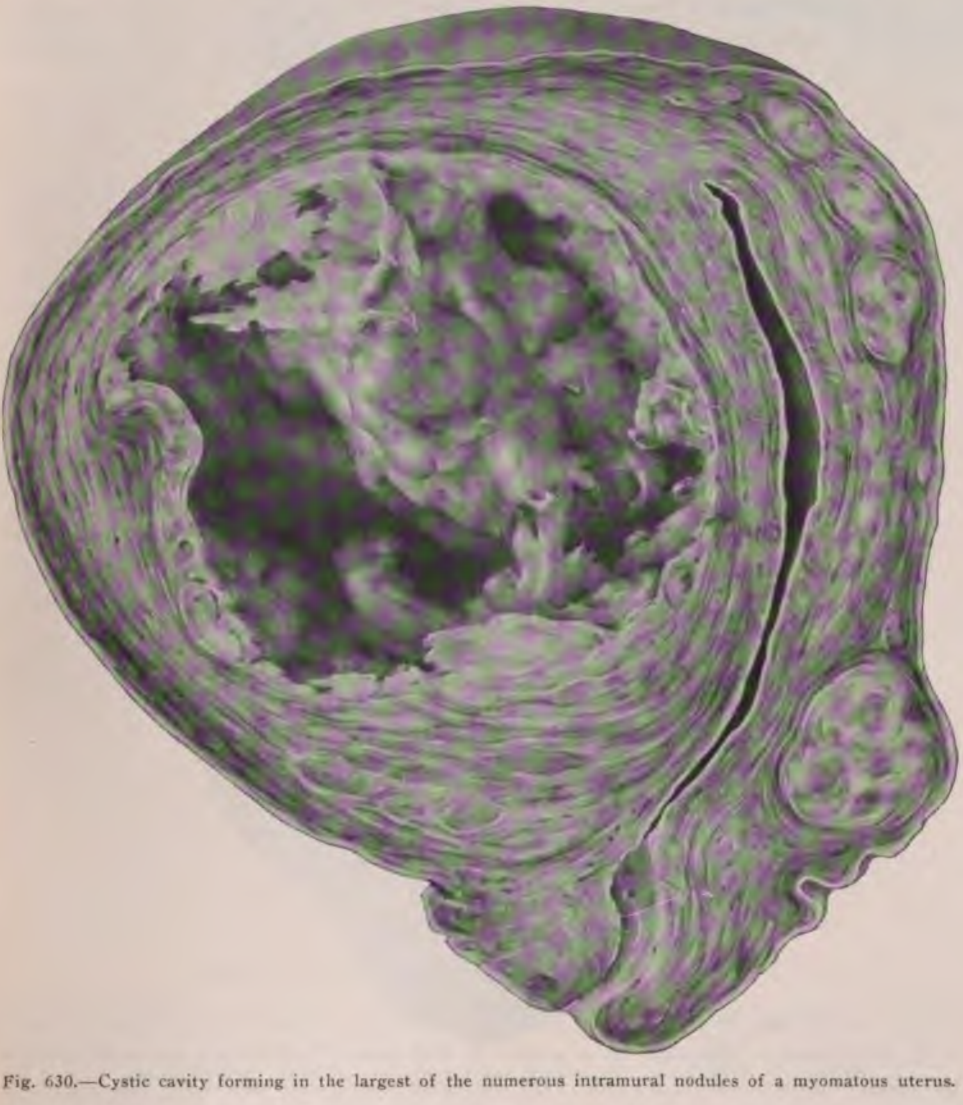


Fig. 630.—Cystic cavity forming in the largest of the numerous intramural nodules of a myomatous uterus.

Thirteen of these sudden deaths occurred in the 366 fibromyoma cases, while the 3,047 other operative cases furnished only 3 such deaths. It occurred 36 times as frequently in the fibroid cases as in the general run of operative cases.

Other visceral degenerations from the chronic anemia, from pressure on the ureters and from other effects of the myoma, produce fatalities due really to the myoma but attributed to other cases.

SYMPTOMS AND SIGNS

Symptoms

The symptoms given by the patient are, in the usual order of their appearance, (1) menorrhagia, (2) leucorrhea, (3) pressure symptoms, (4) pain and (5) a lump in the lower abdomen.

1. **Menorrhagia.**—This is usually the first disturbance noticed, particularly in submucous and interstitial growths. There is much variation in the menstrual disturbance. Usually the flow is increased, but sometimes it is diminished. Emmet, in a series of 216 cases, found the menstrual flow decidedly increased in 50 per cent, unchanged in 20 per cent, lessened in 16 per cent and irregular in 13 per cent.

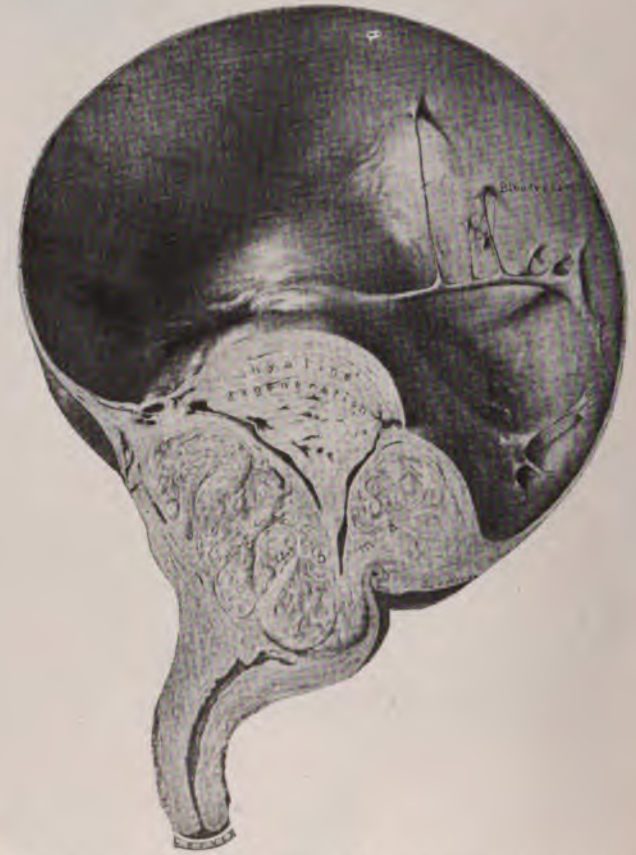


Fig. 631.—A large cystic myoma. (Kelly—*Operative Gynecology.*)

2. **Leucorrhea** is usually present after a time, especially in the submucous and interstitial growths.

3. **Pressure Symptoms.**—These are indefinite, simply an indication that there is some slight disturbing element in the pelvis. The patient has some bladder irritability and a feeling of weight in the pelvis. There is usually

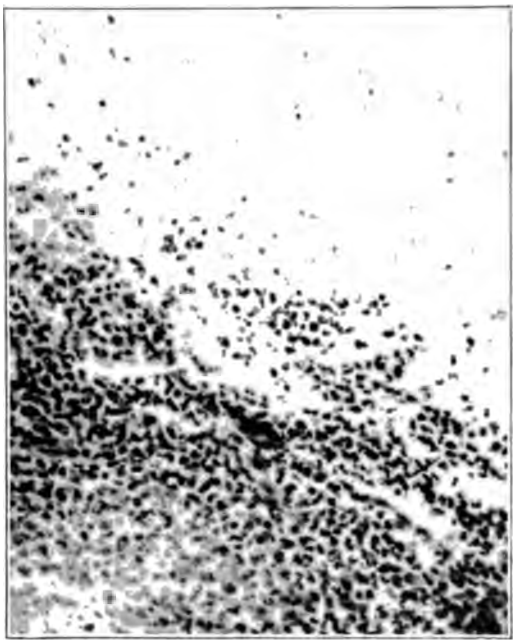


Fig. 632.—Photomicrograph of suppurating myoma. Gyn. Lab.

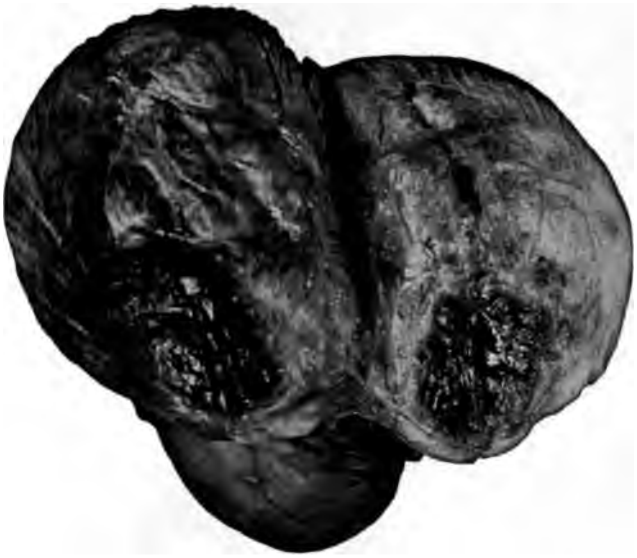


Fig. 633.—Necrosis of an intraligamentary myoma. (Hirst—*Diseases of Women*.)

constipation. After the tumor becomes large, marked pressure symptoms occur.

4. **Pain** appears later. It is usually present as a backache (lumbar or sacral) or as pain in the lower abdomen or a thigh-pain on one or both sides. The pains usually come and go at first, and are worse when the patient is on her feet and also at the menstrual periods.

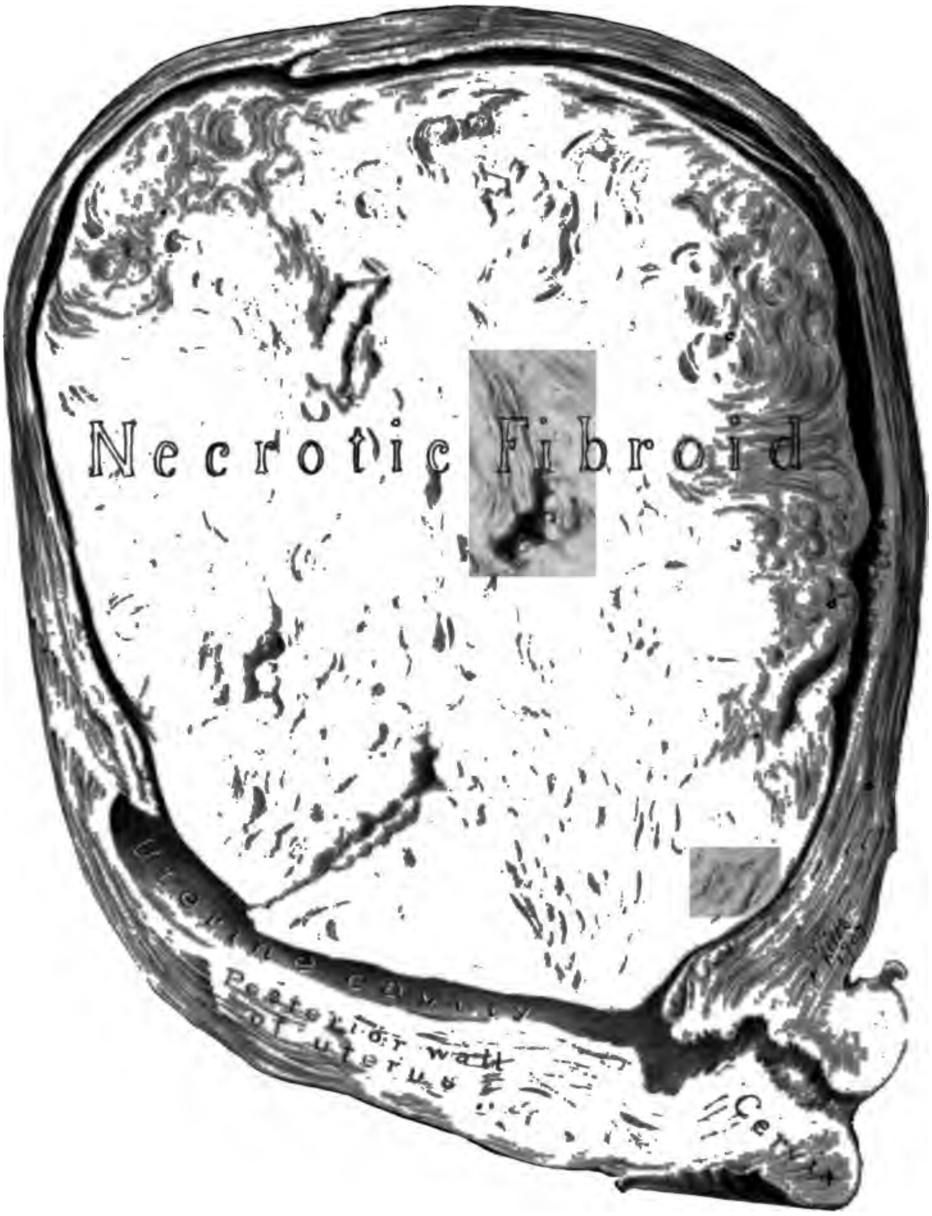


Fig. 634.—Section of a necrotic myoma. The author saw the patient in consultation with Dr. C. O. C. Max. There was a large myoma extending nearly to the umbilicus, which had become necrotic from infection due to the introduction of a uterine sound by a midwife. The patient was in a desperate condition. At the operation it was found that the necrotic myoma had perforated the uterine wall and was in contact with the omentum. This anteroposterior section of the removed uterus and tumor shows accurately the relation of the necrotic mass to the uterine wall. It was almost free in its suppurating bed. Fig. 635 shows the perforation through the uterine wall. Gyn. Lab.

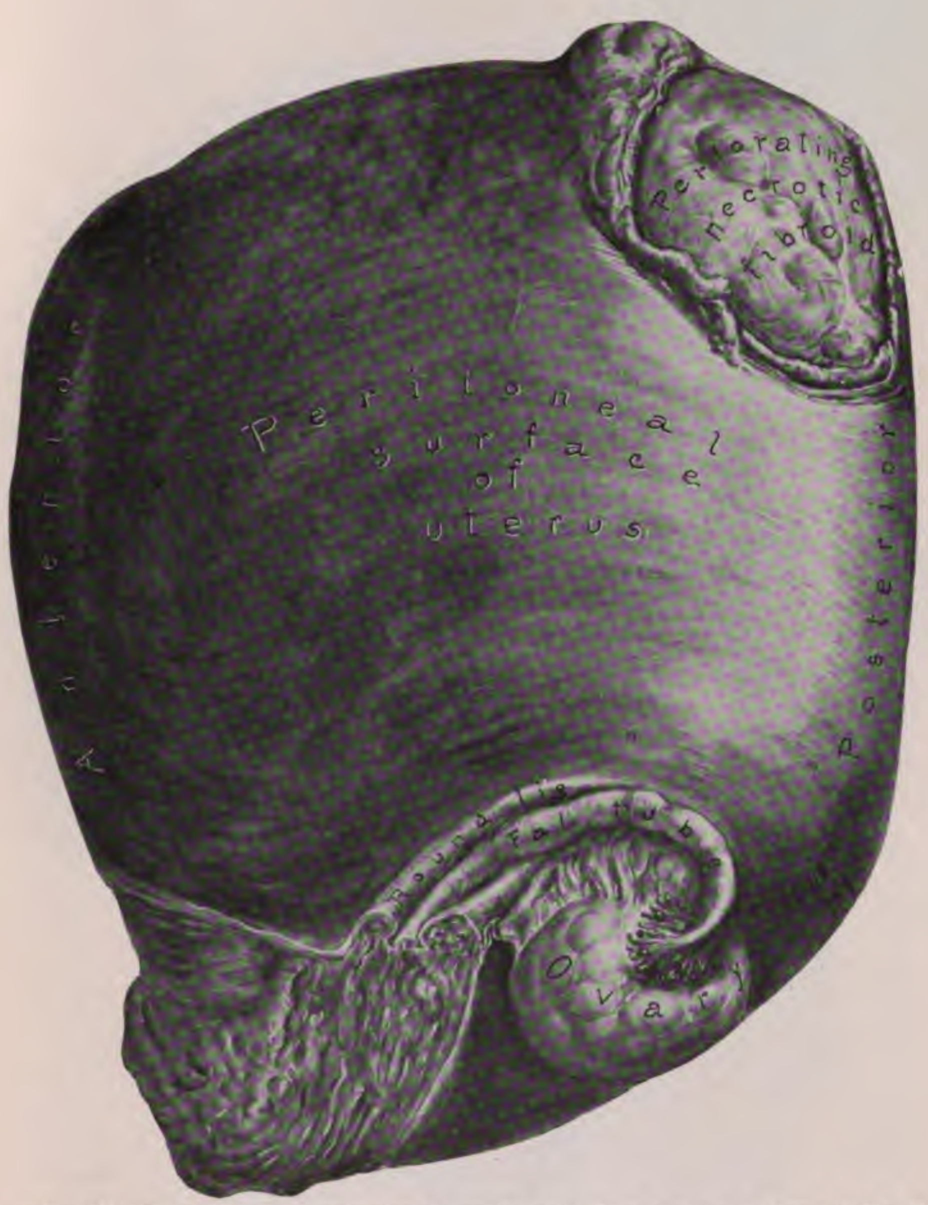


Fig. 635.—A necrotic myoma perforating the uterine wall. Same specimen as shown in Fig. 634. The specimen consists of the uterus and tumor removed by total hysterectomy. The patient recovered. The perforation here shown was covered by adherent omentum. As soon as the omental adhesions were separated, pus from the suppurating bed in which the necrotic mass lay poured into the peritoneal cavity. The tumor was large and the perforation was at the top of the mass, near the umbilicus. Gyn. Lab.

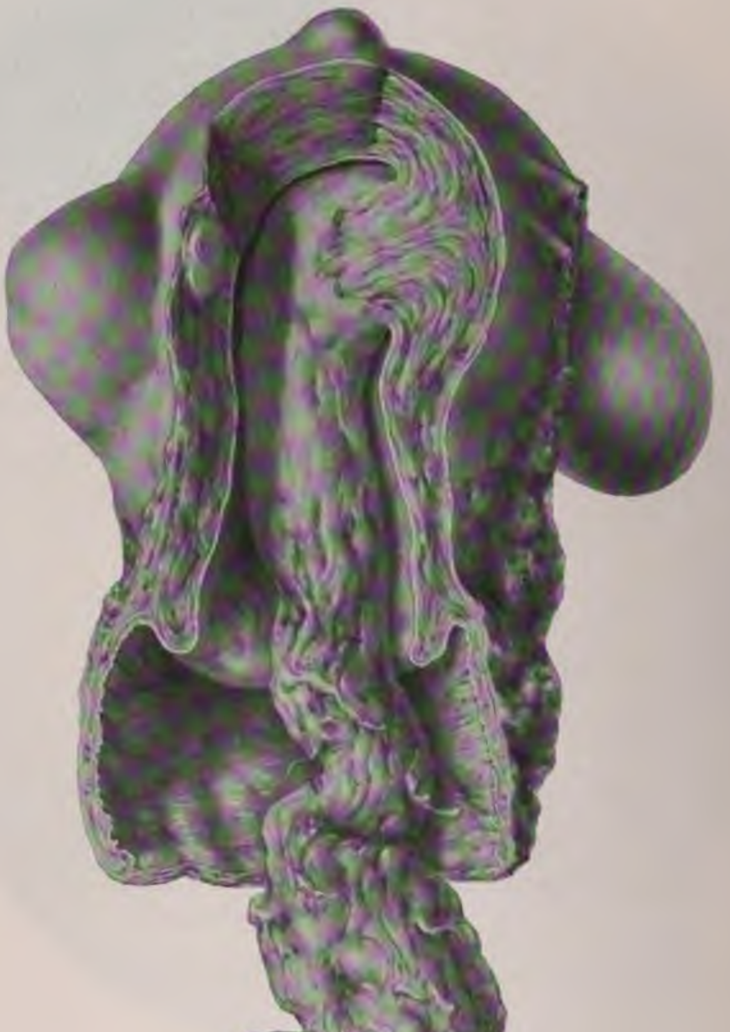


Fig. 636.—A large pediculated submucous myoma which suppurated and the greater part of which became necrotic, only the shell remaining. This collapsed shell is seen lying in the vagina. Gyn. Lab.

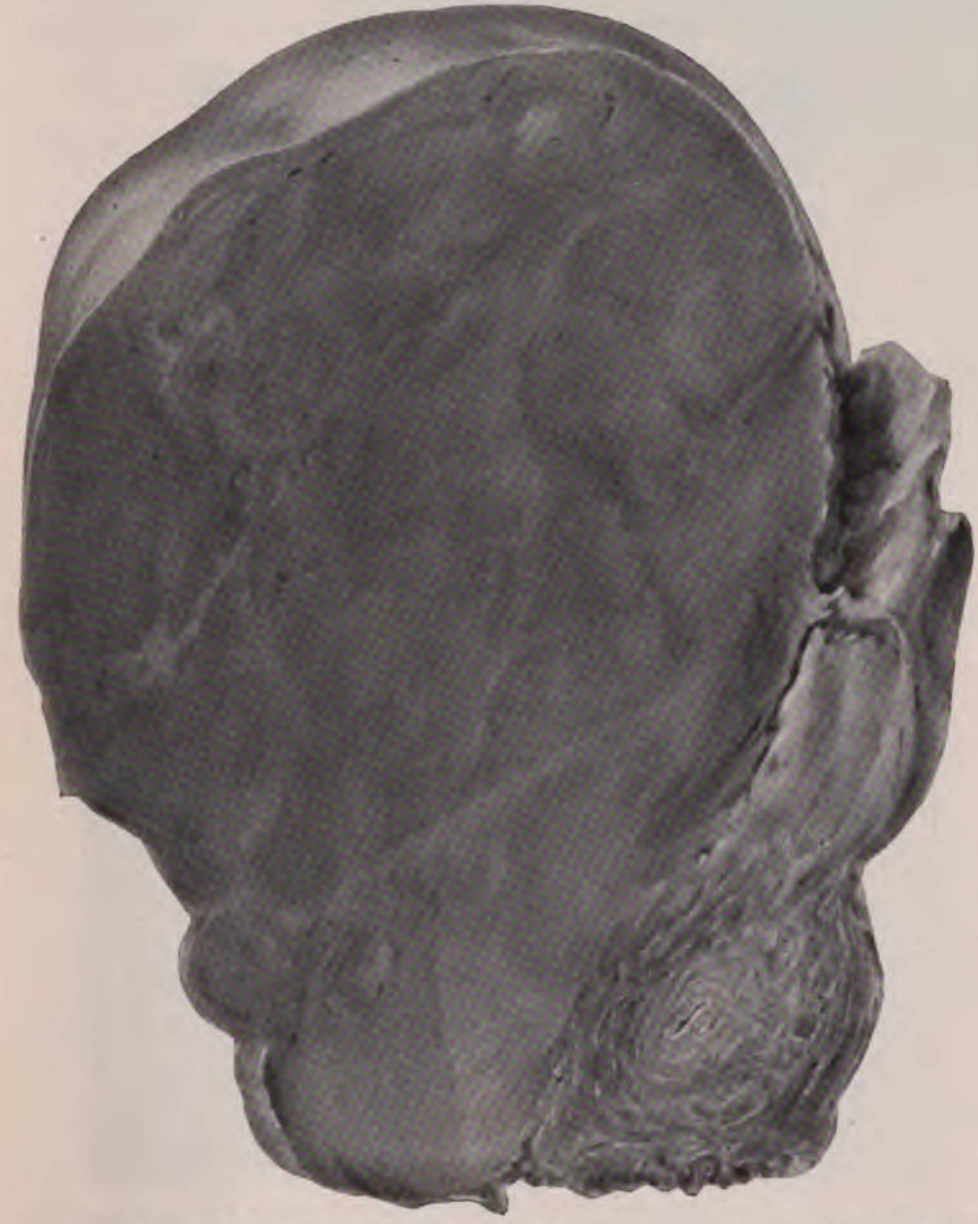


Fig. 637.—Section through a sarcoma originating in a myoma of the uterus. This specimen is unusual in that the sarcomatous change is so uniform throughout the large tumor. A cross section of the uterus is seen at the lower right corner. Gyn. Lab.

5. **Lump.**—In a large proportion of the cases, after some months or years a lump is noticed in the lower abdomen. If the mass is smooth, however, it is surprising how large it will sometimes get before the patient notices it. Of course a mass with nodular projections is usually noticed as soon as it begins to distend the lower abdomen. In a certain proportion of cases, the

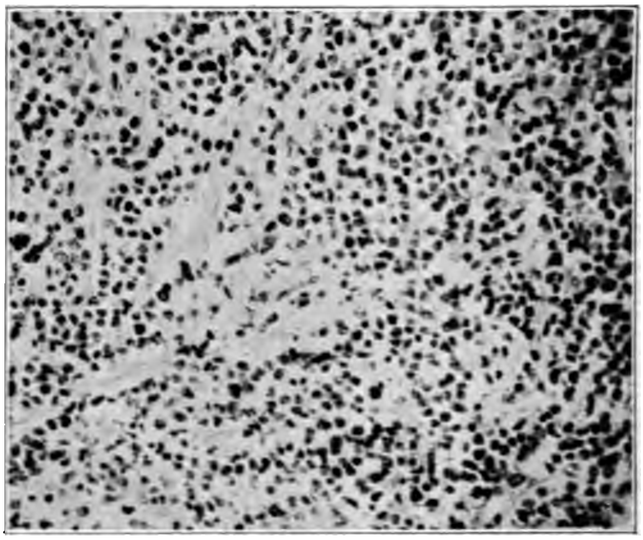
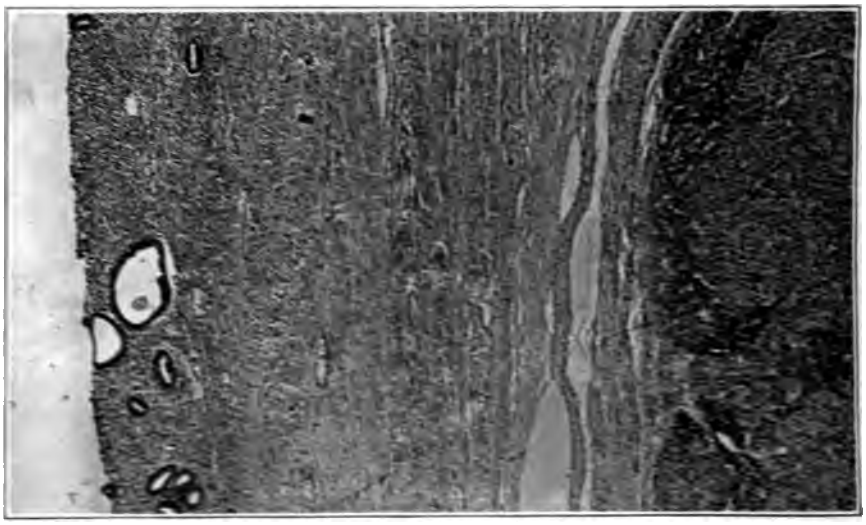


Fig. [illegible]38.—Photomicrograph of section from the tumor shown in Fig. [illegible]37. Gyn. Lab.



[illegible] cm. in diameter. At [illegible] at the right the edge of [illegible]

mass even when large is still [illegible] deeply placed in the pelvis to be appreciable to the patient, and in [illegible] the mass is not appreciable to the physician even [illegible] examination, though there may be much bleeding and distress.

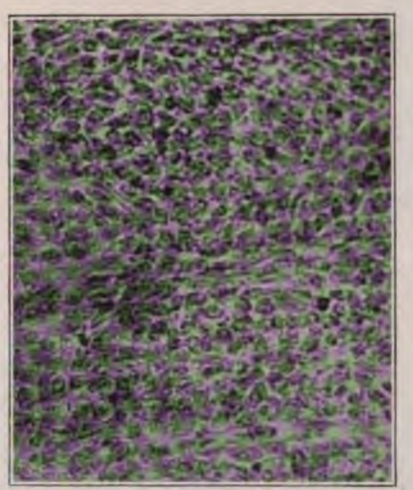


Fig. 640.—Sarcomatous change in submucous myoma. High power of Fig. 639. Large cells, chiefly spindle, occasional mitotic figure in field.

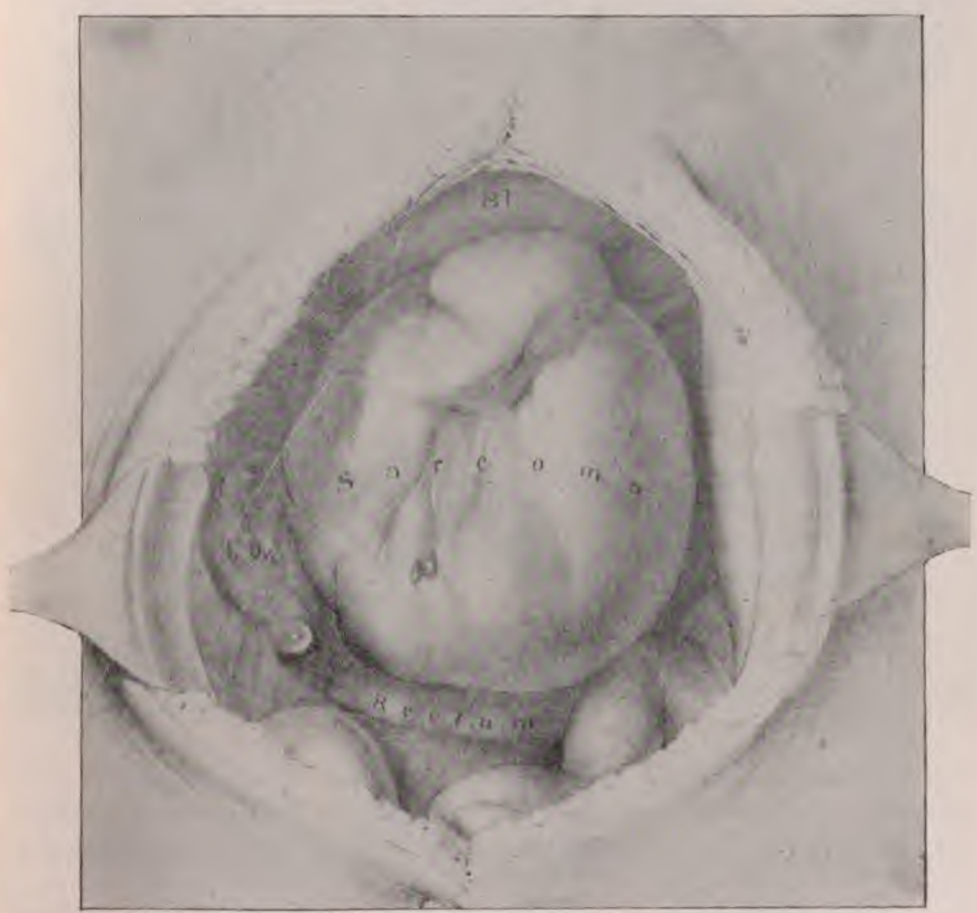


Fig. 641.—A sarcoma developing in the cervical stump, after a supravaginal hysterectomy for a supposedly simple myoma. After the development of the sarcoma the original tumor was sectioned and examined and several areas of sarcomatous degeneration were found in it. (Cullen—*Jour. Am. Med. Assn.*)

Examination Findings

The diagnosis of uterine myoma must rest on the examination findings, for the symptoms are not distinctive. Taking up the points as given in the Chapter on Examination, we find as follows in the case of a fibromyoma:

1. **Position of Mass.**—In the central part of the pelvis and extending from there toward one side.

2. **Size of Mass.**—May be any size, from one barely palpable in the wall of the uterus to a large tumor filling the abdomen.

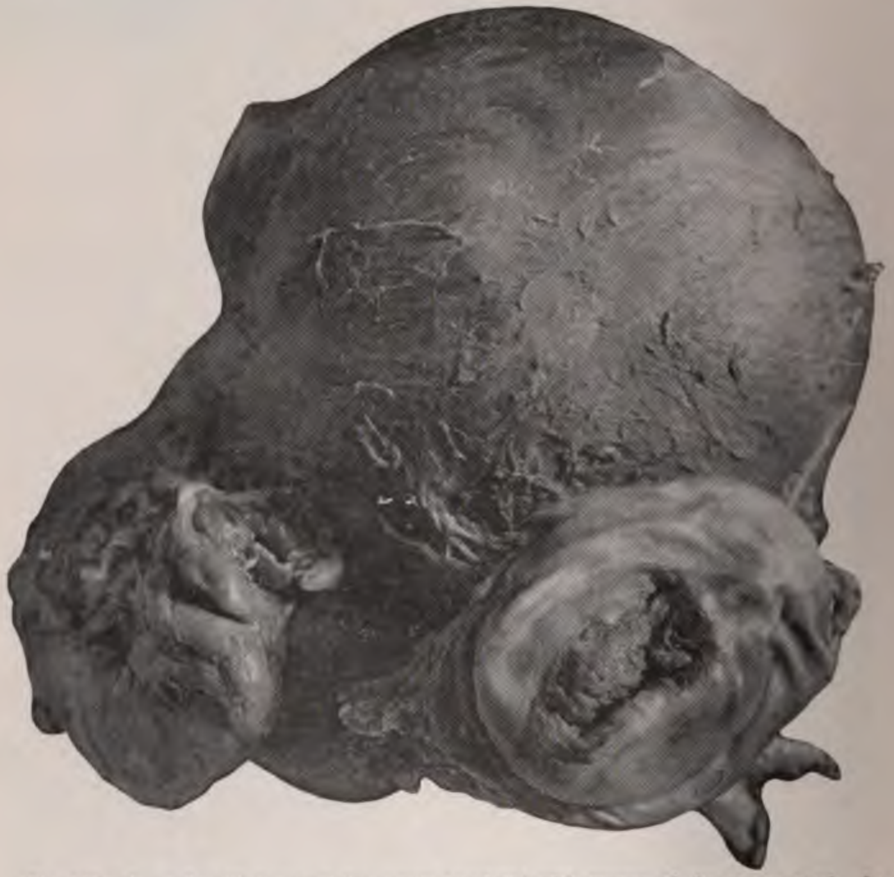


Fig. 642.—A small epithelioma of the cervix associated with myoma of the corpus uteri. In this case the most evident lesion was the myoma, but further examination revealed induration and irregularity about the external os, with some bleeding on examination. A piece of tissue excised from the suspicious area and submitted to microscopic examination showed epithelioma.

3. **Shape.**—Individual tumors are apparently spherical, but as they project from the uterus or grow beside each other, they form a mass of very irregular contour, usually presenting several distinct bosses or rounded projections outside the general outline of the mass.

4. **Consistency.**—Firm, usually much harder than the adjacent uterine wall. Occasionally, part of a tumor will undergo cystic change—but even then the greater part of the mass is usually solid.

5. **Tenderness.**—Not tender, unless incarcerated in pelvis or pressing on nerves or accompanied with inflammation.

6. **Mobility.**—The tumor and uterus are movable together up and down in the pelvis, but they are not movable separately unless the fibroid is pediculated.

7. **Attachment.**—Attached in the uterine region and free elesewhere, unless complicated. A subperitoneal myoma with a long pedicle may be mistaken for a growth from some of the abdominal organs. The pedicle connecting the mass with the uterus, can usually be felt on deep bimanual palpation. In a difficult case, a useful expedient is to have an assistant grasp the tumor and draw it up into the abdomen while the examiner makes deep bimanual palpation in search of the pedicle, which is thus made tense and is

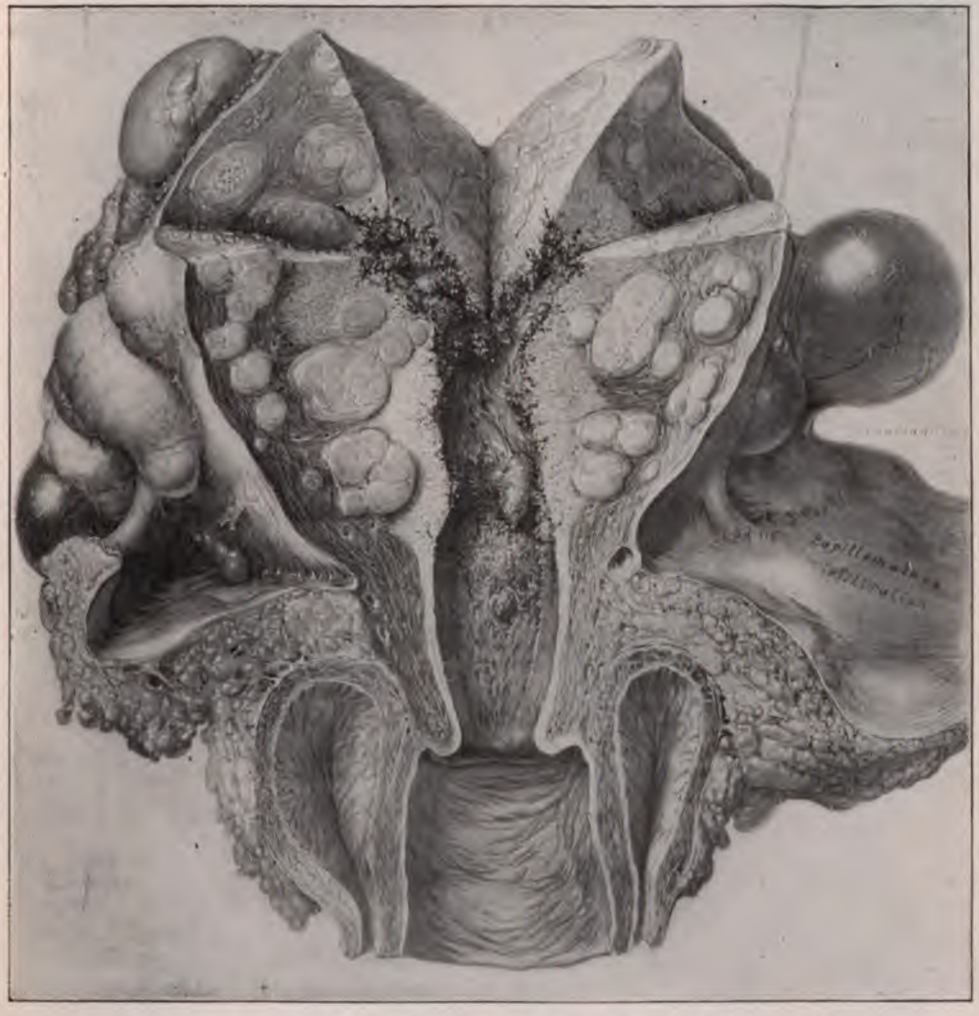


Fig. 643.—Large mass in pelvis formed by uterine myomata and carcinoma. (Cullen—*Cancer of the Uterus.*)

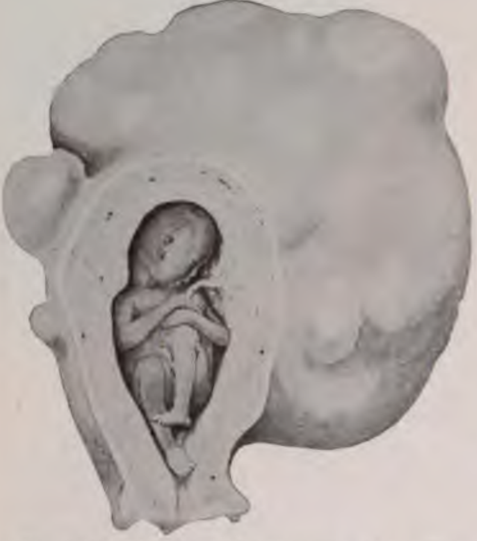


Fig. 644.—Myoma and pregnancy, the tumor forming the most of the mass. (Dudley—*Practice of Gynecology.*)

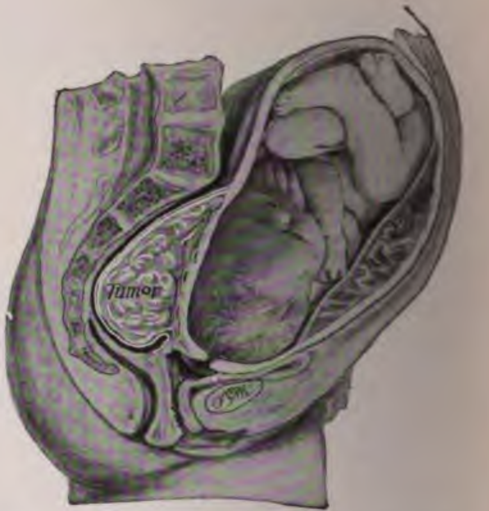


Fig. 645.—Myoma and pregnancy, the pregnancy forming the larger part of the mass. (Norris, after Simpson—*American Textbook of Obstetrics.*)

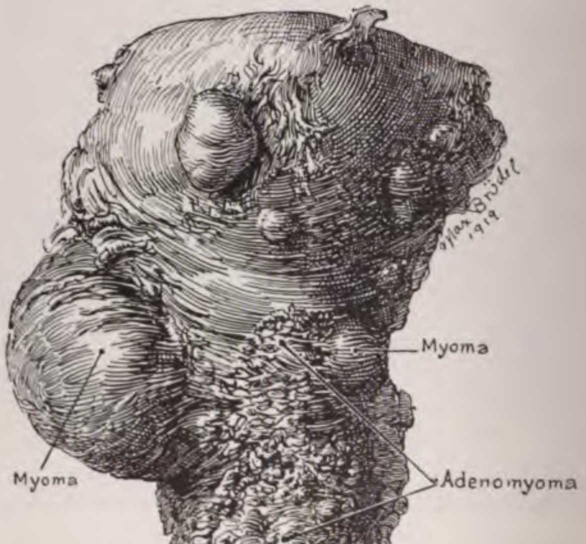


Fig. 646.—Complicating adhesions. Notice how this uterus has had to be dug away from the rectum to which it was bound by the adenomyoma. The adenomyomata form extensive and serious complicating adhesions to the rectum, sigmoid, cecum, and all adjacent structures. (Cullen—*Archives of Surgery.*)

more easily felt (Fig. 149). Occasionally a myoma becomes detached from the uterus or has such a long pedicle that it appears free, but that is rare.

When making the diagnosis of myoma of the uterus, the following conditions and questions must be considered:

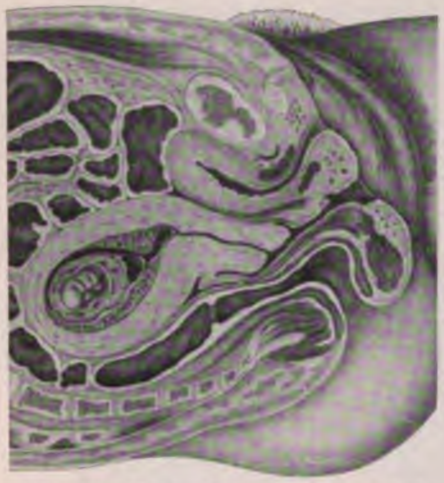


Fig. 647.—Early pregnancy with marked retrodisplacement of uterus. (Edgar—*Practice of Obstetrics.*)

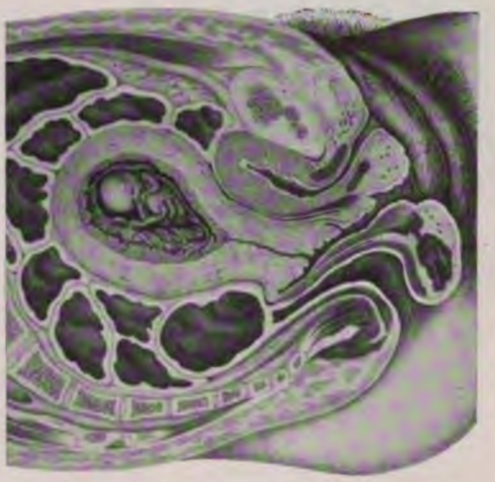


Fig. 648.—Early pregnancy with moderate retrodisplacement of uterus. (Edgar—*Practice of Obstetrics.*)

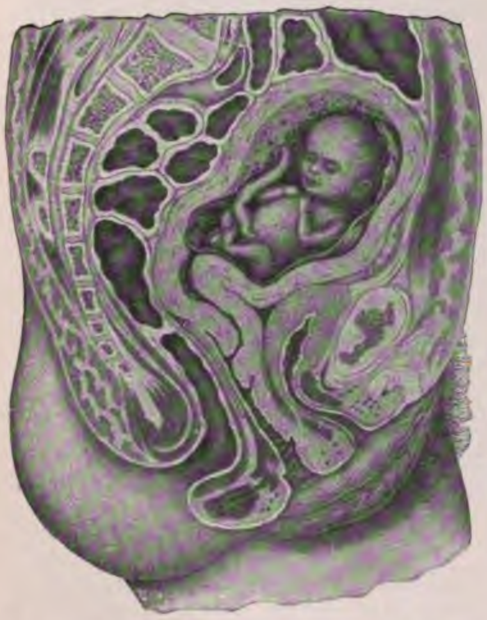


Fig. 649.—Pregnancy, about five months. (Edgar—*Practice of Obstetrics.*)

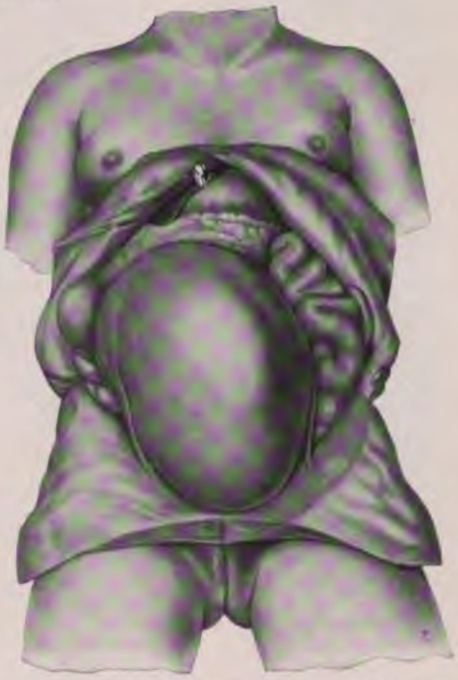


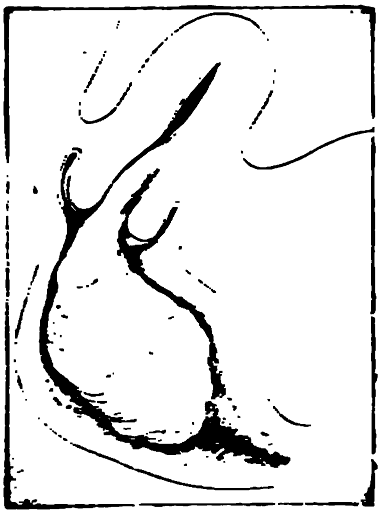
Fig. 650.—Pregnancy at full term. (Edgar—*Practice of Obstetrics.*)

A. Pregnancy must always be considered in any enlargement of the uterus and the normal and abnormal conditions of pregnancy kept in mind. (Figs. 647 to 651).

B. OTHER DISEASES PRESENTING A MASS OR INDURATION, which may be mistaken for a myoma. The more common of these diseases are salpingitis with exudate, pelvic cellulitis, hydrosalpinx, pregnancy, extrauterine pregnancy, pelvic tuberculosis, ovarian or parovarian tumor, cancer of the uterus.

C. DISEASES OF THE UTERUS WITHOUT A MASS OR INDURATION, which may be mistaken for myoma, principally on account of bleeding. For example, retrodisplaced uterus with [illegible] endometritis, [illegible] endometritis with subinvolution, carcinoma, [illegible] of uterus, prolapse of uterus, inversion of uterus (Figs. 652 to 662).

Fig. [illegible].—Irregular [illegible] of the pregnant uterus that may [illegible] may lead to mistaken diagnosis. [illegible]



[illegible]

[illegible] myoma causing [illegible] a large [illegible] of the myoma [illegible] the bladder at the level of the line [illegible] the peritoneal cavity. (Thomas [illegible] Women.)

D MYOMA WITH COMPLICATIONS. In a case presenting anomalous symptoms, the condition may be a myoma complicated with pregnancy (Figs. 644, 645) or extrauterine pregnancy or salpingitis or ovarian tumor or broad ligament tumor or malignant disease of the uterus or retrodisplacement (Figs. 663, 664) or ascites (Figs. 665, 666).

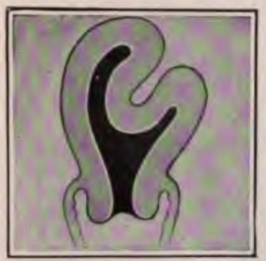


Fig. 654.—Beginning inversion of the uterus.

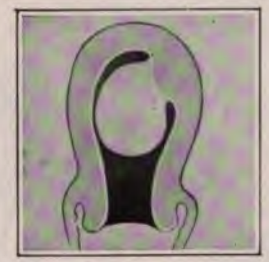


Fig. 655.—Submucous myoma with short pedicle.

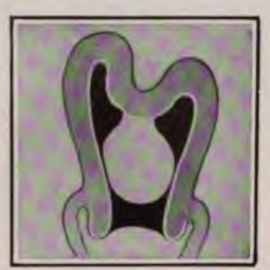


Fig. 656. — Submucous myoma and beginning inversion.

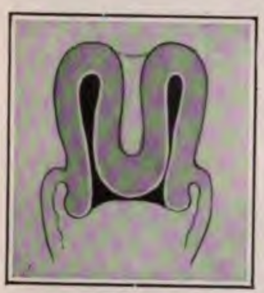


Fig. 657.—Partial inversion of uterus.

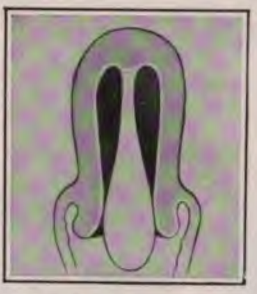


Fig. 658.—Submucous myoma with long pedicle.

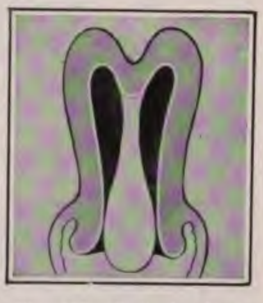


Fig. 659.—Pediculated myoma and partial inversion.

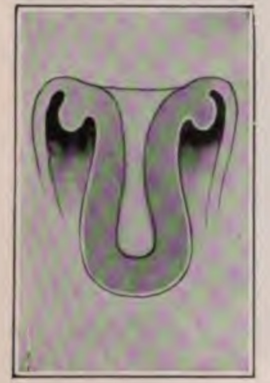


Fig. 660.—Complete inversion of uterus.

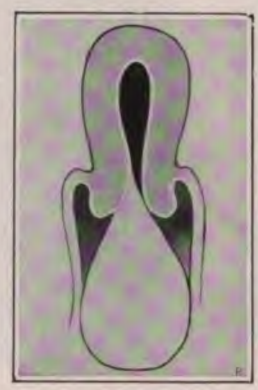


Fig. 661. — Pediculated myoma filling upper part of vagina.

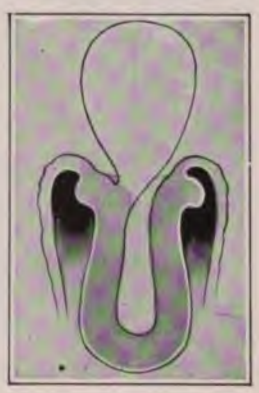


Fig. 662.—Complete inversion of uterus, with a pediculated subperitoneal myoma occupying the normal site of the uterus.

Figs. 654 to 662.—Diagnosis—Inversion and pediculated myoma. (Dudley—*Practice of Gynecology*.)

E. Additional questions. After it has been established that a uterine myoma is present, the following points are to be considered:

1. Does the myoma cause all the symptoms? If not, what symptoms are caused by it? What causes the other symptoms?

2. What is the relation of the tumor or tumors to the **uterine wall and** cavity?
3. What is the relation of the tumor or tumors to the **other pelvic organs** and to the pelvic wall and to the peritoneum? (**Figs. 644, 645.**)

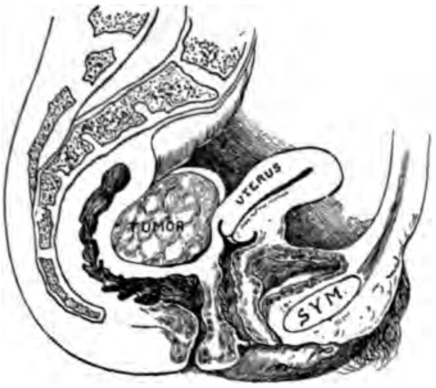


Fig. 643.—A myoma forming a mass behind the uterus. (Montgomery—*Practical Gynecology.*)

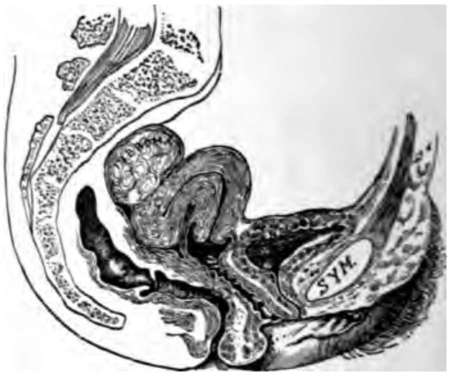


Fig. 644. –A retroflexed uterus and a myoma forming a mass behind the cervix. (Montgomery—*Practical Gynecology.*)

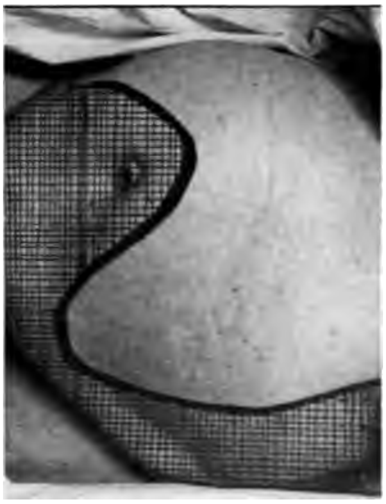


Fig. 645.—A case of ascites and myoma. Showing the area of dullness with patient on her back. The central dullness is caused by the myoma and the lateral dullness by ascitic fluid. The dullness is practically the same on the two sides.

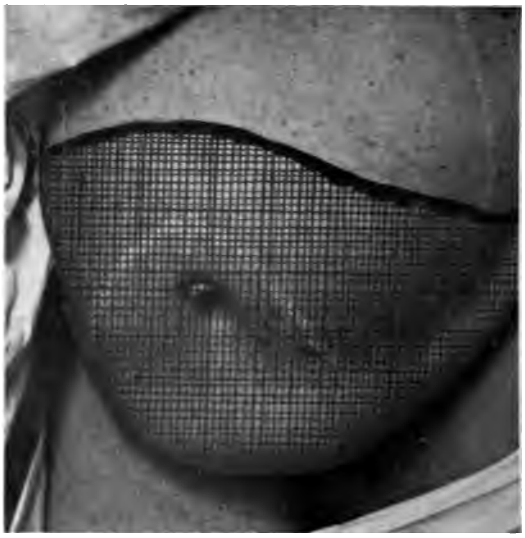


Fig. 646.—Ascites and myoma. Area of dullness with patient standing. Same patient as Fig. 645. Notice the marked change in the upper limit of the dullness. It is now almost horizontal.

4. What complications are present—particularly pregnancy, **malignant disease** (Figs. 642, 643), pelvic inflammation, **heart disease, kidney** disease?
5. What has been the progress of the disease in this **case, and what** will probably be the further progress?

TREATMENT

In regard to treatment there are three propositions to be considered: (A) no treatment, (B) palliative treatment and (C) curative treatment.

A. NO TREATMENT

A certain small percentage of myomata are discovered by accident, i.e., during a pelvic examination for symptoms not due to the fibroid. The myoma is small, has caused no symptoms, is not likely to cause symptoms soon, and is not likely to aggravate the symptoms due to the other trouble.

Such a tumor requires no treatment, and it is just as well, as a rule, that the patient be not informed of its presence. She should, however, be kept under observation, to see whether there is any increase in the growth. Explain the condition to the husband or other responsible relative, that your skill be not called in question should the patient be examined by some other physician and the presence of a tumor announced.

There is one class of small myomata, that the author feels constitutes an exception to this rule of "no symptoms, no treatment," namely, cervical myomata. When situated in the lower part of the uterus, a myoma of any considerable size is a dangerous matter in the child-bearing period. If pregnancy should take place, the tumor will probably increase in size and may become a serious menace to labor at term. Again, a cervical myoma is likely to cause symptoms (bladder, rectal or menstrual) at any time, even though small. Such a tumor in a married woman should be removed. If not complicated by tumors elsewhere in the uterus, it may be approached from the vagina and removed by a comparatively simple operation.

B. PALLIATIVE TREATMENT

Palliative treatment is symptomatic. It is directed towards relieving the disturbances occasioned by the fibroid and making the patient more comfortable. The principal disturbances requiring the palliative treatment are the bleeding and the pressure symptoms.

Measures for Palliative Treatment

The palliative measures are (1) tonic measures, (2) uterine astringents, (3) vaginal packings, (4) intrauterine treatment, (5) ligation of uterine arteries, and (6) removal of ovaries with ligation of ovarian arteries, (7) treatment with x-rays and radium, which in a considerable percentage of the cases yields, not only a palliative, but a permanently curative, effect.

1. **General Tonic and Hygienic Measures.**—The better the patient's general health, the less the annoyance from the myoma. Consequently there should be employed laxatives (as in pelvic inflammation), tonic medicines, avoidance of long walks, rest at the menstrual periods, douches as indicated by discharge, and a general regime to improve the general health and diminish pelvic congestion.

2. **Uterine Astringents** are hemostatic remedies, administered for the purpose of diminishing the bleeding (menorrhagia and metrorrhagia). The hemostatic remedies thus used are ergotin, stypticin, hydrastinin, adrenalin, thyroid extract, mammary extract and calcium-chloride.

Ergotin is the one that has been most extensively used. It is an exceedingly useful remedy for temporarily lessening the menorrhagia. Continued for several months in one grain to two grain doses it produces marked improvement in certain cases. Other tonics may be combined with the ergotin and if there is much pain it is well to combine also a sedative such as cannabis indica.

Byford cites a series of 101 fibroid cases treated by ergot. Twenty were reported cured. In 39 others the tumor was reduced in size and the symptoms relieved. In 19 others the hemorrhage diminished but the tumor remained the same size. In 21 there was no effect. If there is a pediculated submucous myoma, ergot is not likely to diminish the bleeding. Even in cases where operation is necessary, ergot (preferably in the form of ergotin) is a useful palliative measure while the patient is waiting.

3. **Vaginal Treatment.**—Antiseptic vaginal douches are required in cases presenting leucorrhea or bloody discharge. Vaginal packing may be needed to check bleeding temporarily or to raise an impacted tumor out of the pelvis. A firm vaginal packing of antiseptic gauze, or of cotton is an excellent measure for temporary control of bleeding from within the uterus. The patient is kept quiet in bed and the packing changed every two or three days as necessary to prevent decomposition. This may be used in conjunction with uterine astringents, to control bleeding temporarily, while the patient is being built up for operation or is being taken to a place for operation. When the bleeding can be thus controlled, the dangers of intrauterine disturbance (packing, instrumentation) are thus avoided.

4. **Intrauterine Measures.**—The intrauterine measures for the control of the hemorrhage are (a) curettage and (b) applications and packing.

a. CURETTAGE may control bleeding temporarily in those cases in which the bleeding is due to hyperplasia of the endometrium. In many cases, however, the cavity is so distorted that the curet can only wound parts of the wall here and there without removing the entire endometrium. In addition to this uncertainty of controlling the hemorrhage, there is danger of infection of the uterine wall or infection and necrosis of the growth, leading to an exceedingly dangerous condition. Schroeder reports a case of necrosis of a submucous tumor, the capsule of which had been torn by the curet.

In carefully selected cases, curettage may be advisable, partially as a diagnostic measure, but there must be a clear understanding of the dangers incident to it and good reason for taking the risk. In the hands of those experienced in the selection of cases and in the use of the curet, the probability of any serious complication from a clean curettage is not great. But there is great risk in careless intrauterine instrumentation in these cases, even the simple introduction of the uterine sound (see Figs. 634, 635).

b. INTRAUTERINE APPLICATIONS are dangerous and inefficient. In inoperable cases the judicious use of the curet or of electricity is preferable. Occasionally, as an emergency measure for the immediate control of alarming hemorrhage, intrauterine packing may be used. But usually a firm vaginal packing will secure the same results without the dangers incident to intrauterine instrumentation.

C. CURATIVE TREATMENT

In the curative treatment of myomata, three measures are employed—**radium, x-ray** and **operative removal.**

The subject of choice between radium, x-ray, and the knife, in the treatment of uterine myoma and uterine cancer, presents much confusion at present, and the differences of opinion expressed are too marked and radical to be simply errors of observation. There are two important factors back of this situation. The first is the newness and incompleteness of the knowledge concerning radium and x-ray therapy. The information concerning them is coming in so rapidly that a considerable part of it is still undigested, as far as sustaining clinical practice is concerned. Some opinions are evidently based on enthusiastic hopes rather than on tested evidence. The second factor is that many of the radical pronouncements as to treatment are by workers familiar with only one or two of the measures under consideration.

Having all three measures available and wishing to give each patient what was best for the special conditions present in her case, the author has for a considerable time been making a study of this particular phase of the subject, i.e., of the *choice* in the individual case. In a subject which is growing so rapidly and in which so much of the knowledge is new and more or less obscure, particular care is required to be sure that the choice is based on established facts; for facts and fancies intermingle confusingly in the literature of these measures. While the choice of treatment must shift according to new evidence coming in, a certain amount of conservatism or critical "show me" spirit in the physician is invaluable to the patients who depend upon him in these serious conditions.

In uterine myoma the three measures mentioned, rightly used according to present knowledge, are not antagonistic or exclusive one of the other. Rather they are supplementary. Each has its field in which it is clearly the best treatment. The edges of the fields merge, of course, giving classes of cases in which the choice is not strongly one way or the other. The future may witness marked changes in these fields but for the present the following represents the author's working choice in the different classes of cases.

Radium

Radium is the preferable form of treatment in the following classes of cases:

1. In uncomplicated small and medium-sized myomata in patients in the menopause or near the end of the child-bearing period. Persistent bleeding is usually the serious symptom in these cases and this is promptly controlled by radium, which checks all bleeding, menstrual or otherwise. Nearly all properly selected cases prove amenable to this treatment. In approximately 400 reported cases, satisfactory results were secured in about 95 per cent.

In the cases of myoma apparently suitable for radium treatment, complicating carcinoma of the endometrium must be excluded by curettage. This is very important. The author found this unsuspected complication in two cases within the last year. Each case presented myomatous nodules of the size and type suitable for radium treatment. Following his custom at radium application, the author made a preliminary curettage and sent the scrapings for routine examination. The laboratory returns showed complicating endometrial carcinoma, and this diagnosis was confirmed in each case by the findings in the removed uterus. In one case the associated carcinoma was rather extensive and in the other case it was still confined to a small area.

In young women the preservation of the child-bearing function and of menstruation is desirable, hence in this class myomectomy is preferable to radium.

2. In patients with kidney, heart and other complications giving undue operative risk, radium may reasonably be tried in the somewhat larger growths, especially in those cases where x-ray treatment produces such marked nausea and ill feeling that it is not advisable to continue it.

In these complicated cases, also, carcinoma of the endometrium should be excluded by preliminary curettage if possible. Of course, in these seriously complicated cases, general anesthesia is to be avoided. In the author's experience the curettage and radium application may in most of these cases be accomplished under morphia hyoscine analgesia. In the exceptional cases where necessary this analgesia may be supplemented by local infiltration-anesthesia of the cervix or by short ether inhalation, as preferred.

X-Ray

The larger growths in patients presenting undue operative risk are best handled by deep x-ray therapy. In most cases this will, after a time, stop the bleeding temporarily and give a [illegible] build up the patient for operation. If she cannot be gotten [illegible] operation, continuation of the x-ray treatment may stop [illegible] permanently and diminish pressure symptoms by shrinking [illegible]

[illegible] x-ray instead [illegible] symptomatic cures. In [illegible] bleeding was stopped [illegible] treatment has the disad- [illegible] massive doses [illegible] symptoms in [illegible] patients who [illegible] stating that [illegible] in their such [illegible] that are small [illegible]

As a rule the x-ray treatment should be preceded by *diagnostic curettage*, to exclude complicating malignancy. Occasionally the circumstances of the case are such that one feels justified in taking the risk of omitting the diagnostic curettage, at least for a time. A serious coincident disease may make it advisable to avoid any upset to the patient's physical or nervous balance. The author recalls three cases during the past year in which this rather risky plan was followed. In one the cardiovascular condition contraindicated any upset to the patient, such as curettage, and yet the persistent bleeding was making the condition steadily worse. Under x-ray treatment the bleeding stopped for several months, enabling the patient to get into very much better condition. Later, when the bleeding started again, the myomatous uterus was promptly removed while the patient was still in fair condition. There was considerable degeneration in one of the large nodules but no malignancy either there or in the endometrium. In another patient with a large tumor, persistent bleeding and severe anemia, the cardiac breakdown was so marked that it was not expected the patient would ever rise from her bed. Under x-ray treatment the bleeding stopped, and under suitable medication and diet the anemia and cardiac condition improved, and now after several months the patient is up and about and comes to the office. So far, there has been no return of the bleeding. The third patient, in addition to a myoma which she had not noticed, had a nervous or mental disturbance that made it inadvisable even to suggest the presence of any serious trouble in the pelvis. Under x-ray treatment the bleeding associated with the uterine myoma stopped and has not returned after some months. The patient will, of course, be kept under observation. This plan, however, is a risky procedure and is to be adopted only in those very exceptional cases in which any upset to the patient is strongly contraindicated.

Operation

Operative removal of the myoma is the preferable form of treatment in the following classes of cases:

1. The large growths, from the size of a grapefruit and upward, are generally best handled by operation. It is not practicable to fix an arbitrary limit of size, as other conditions have a bearing on the decision. For example, pediculated subperitoneal growths are not so favorable for radium or x-ray treatment as growths embedded in the uterine wall and hence must more often be removed by operation. Again, a single large growth is not so favorable for nonoperative treatment as a myomatous uterus enlarged to the same size by a number of small nodules.

2. In young women in whom preservation of the child-bearing function and of menstruation is desirable, myomectomy is the preferable form of treatment, where any serious treatment at all is necessary. In many of these cases the myomata may be removed without disturbing the functions of the uterus. However, a point to be kept in mind is that when the abdomen is opened it *may* be found necessary to sacrifice the uterus in order to remove the tumors completely. Hence myomectomy should be advised only after careful consideration of all the features of the case. If the growths are not of a size and location necessarily interfering with pregnancy or labor, it would be well to try first to check the bleeding by other means, such as curettage and internal medication. If these measures fail it may be advisable in exceptional cases to employ light doses of radium or x-ray, with the idea of giving just enough to control abnormal bleeding but not enough to affect ovarian or uterine function seriously. But in spite of advances made in the regulation of dosage and the enthusiastic assumptions of some authorities, this use of these measures must be with very decided caution. If the x-ray is used, it is preferable to apply it to one side only, so that one ovary will remain unaffected.

3. In complicated cases the complications often make operation advisable in a growth which if uncomplicated would be suitable for radium or x-ray treatment. The complication may be inflammation of some adjacent structure, for example, appendicitis or salpingitis. Such associated trouble is found in a considerable proportion of the cases of myoma. The complication may be inflammation or degeneration of the myoma itself. Degeneration is common in the larger growths, especially in the subperitoneal masses. A myoma that takes on growth after the menopause is probably undergoing a degenerative change of some kind and should be promptly removed if the patient is a safe operative risk.

Operative Measures

The various operative measures looking to the removal of the growth are as follows:

Myomectomy.—Removal of the tumor or tumors and preservation of the uterus.

Abdominal Myomectomy.—Enucleation from the outer surface of the uterus.

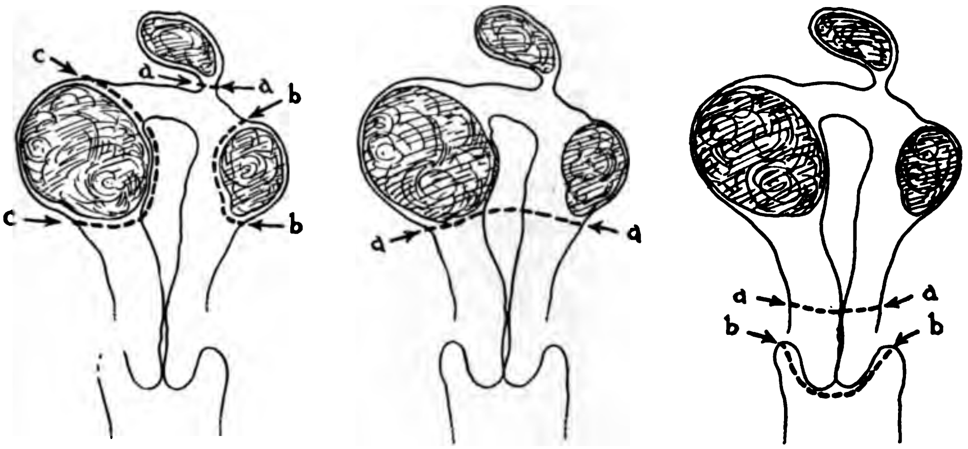
Vaginal Myomectomy.—Enucleation from the cervix or from within the uterus by splitting the cervix.

Supravaginal Hysterectomy.—Removal of the tumor and of the body of the uterus, leaving the cervix. This is, of course, carried out through the abdomen and is the form of operation usually referred to as "abdominal hysterectomy for myoma" and "abdominal hysteromyomectomy."

Total Hysterectomy.—Removal of the tumor and of the entire uterus, including the cervix. This is carried out through the abdomen or through the vagina, as thought best in the particular case. In certain exceptional cases it is preferable to carry out the operation as a combined vaginal and abdominal hysterectomy.

The principles of the operative treatment of uterine myomata by the various methods just mentioned are indicated in Fig. 667. Each of the operative measures given has its advantages and disadvantages in various classes of cases. While there is not space here for a general discussion of this subject it may be advisable to call attention to certain precautions that should be taken in order to avoid cancer of the cervical stump after supravaginal hysterectomy.

The physiologic and technical advantages of leaving the cervix are beyond question. The stubborn fact, that will not down and that stands as a specter imperatively demanding a close study of the question is this: that in a number of cases treated by supravaginal hysterectomy, the patient has later died of malignant disease of the cervix. It is easy to say "for that reason we should remove the cervix in all cases." That would be an easy solution of the problem so far as the operator is concerned, but it would not be the best from the standpoint of results to the patient. The mortality would be higher and the morbidity would be higher—all for the purpose of attaining a security which the author is satisfied can be obtained in a way that is decidedly safer, though somewhat more troublesome.



A. *B.* *C.*

Fig. 667.—The principles involved in the different types of abdominal operation for uterine myoma. *A,* Myomectomy—for a pediculated subperitoneal myoma, for a sessile subperitoneal myoma, and for a myoma that extends to endometrium. *B,* Partial hysterectomy—preserving a considerable part of the corpus uteri and endometrium in the hope of preserving menstruation. *C,* Hysterectomy—supravaginal hysterectomy and complete hysterectomy.

This security is obtained by observing the following precautions before, during, and after operation:

BEFORE OPERATION

1. Examine carefully to exclude malignant disease of the cervix or corpus uteri, in suspicious cases making a microscopic examination of clippings. If malignant disease is found, of course, total hysterectomy with wide removal of the parametrium is indicated.

2. Ascertain whether the cervix is severely lacerated or the seat of chronic irritation from any cause. If so, employ total hysterectomy.

3. If there has been recent infection in the uterine cavity or adjacent tissues, with the development of a condition making immediate operation necessary, employ total hysterectomy.

4. In some cases total hysterectomy is required because of the situation of the tumor.

In all other cases requiring removal of the uterus, supravaginal hysterectomy is the preferable operation.

DURING OPERATION

5. As soon as the tumor is removed, have a responsible assistant open it and make a rapid and critical examination of the tumor and uterus. If anything suggesting malignant change is found, remove the cervix.

AFTER OPERATION

6. After operation submit all specimens to a microscopic examination, of sufficient thoroughness to determine the presence or absence of malignant infiltration. If malignant change is found, promptly remove the cervical stump. This can be readily done per vaginam.

By these measures, supravaginal hysterectomy is limited to cases in which the cervix is practically normal and in which the chance of development of malignant disease is so slight as not to constitute a practical contraindication to preservation of the cervix.

Advisability of Curative Treatment

As previously stated there are cases of small myoma nodules, giving no trouble and not likely to give trouble, that require no treatment. But when a myoma has reached a size to cause uterine bleeding or pressure irritation of surrounding organs, it becomes a definite menace to the individual.

In a rather extensive statistical study of the subject the author reached the following conclusions:

1. A myoma of the uterus, which has reached a size to be appreciated clinically, is a much more serious affection than is generally supposed. A considerable proportion of the patients develop fatal local conditions, another considerable proportion develop serious distant visceral degenerations, and a large proportion of the remainder (possibly most of them) finally pass into a condition of chronic suffering and invalidism.

2. The progress of the disease is so slow as to be deceptive, many cases taking fifteen to twenty years to reach full development—hence the serious results do not appear in the observation of a series of cases for a few years, a few years constituting but a fraction of the developmental period. Yet the widespread teaching that serious conditions develop in only a very small proportion of the cases, is based largely on just such limited observations, recorded and unrecorded. No large series of consecutive cases followed to the end without operation has shown a small mortality.

3. Uterine myoma kills principally by inducing serious local and general complications, that go down in the mortuary records as the cause of death—hence mortuary records give no indication of the ravages of the disease. It kills secretly and indirectly, but none the less surely.

4. The proportion of the various classes that (a) go on to a fatal termination or (b) become chronic sufferers and invalids or (c) develop no serious symptoms, can be exactly determined only by securing accurate records of a large series of cases, comprising all classes, from the beginning of the trouble to the end.

5. Enough is already known to show that delay is dangerous. Many patients develop fatal conditions, many find operation necessary when in such a state as to make the operation exceedingly dangerous, and some must be refused operation because of advanced complications.

6. The chance of satisfactory improvement after the menopause is, speaking generally, more than overbalanced by the frequency of serious degenerative changes and complications.

7. We assume a grave responsibility when we advise a patient to wait until serious symptoms develop before having curative treatment. Taken in time many myomata may be cured completely by radium or x-ray treatment. The cases requiring operative removal are also much more safely handled before serious complications develop. Early operation, under proper conditions, means small risk to the patient. Late operation means great risk.

PREGNANCY AND MYOMA

The association of myoma with pregnancy is always a matter for serious concern, though many patients get along without trouble. Lafour, in a series of 300 cases of myoma and pregnancy in which delivery took place by way of the birth canal, found the maternal mortality 40 per cent and the infantile mortality 77 per cent. In a series of 147 cases of fibroid and parturition, collected by Susserott, the maternal mortality was 53 per cent and the infantile mortality 66 per cent. In 20 per cent of these cases forceps were used, with the loss of 8 mothers and 13 children.

Johnston estimated that during pregnancy or labor one-third of the mothers and more than one-half of the children die, and recommends celibacy when the tumor cannot be removed. Rosenwasser said in 1899 that antisepsis and improved technic had reduced the maternal mortality only to 37 per cent.

Methods of Treatment

1. **Non-interference.**—The patient is allowed to go along until term, in the hope that there may be a satisfactory delivery (spontaneous or operative). As mentioned later, this is the preferable plan in many cases. The results have been reported in various series of cases, as follows:

Spontaneous Delivery.—In a series of 84 cases of labor complicated by myomata, 64 per cent of the patients managed to deliver themselves, while 36 per cent required assistance by forceps or otherwise.

Forceps.—In Veit's series of 39 forceps cases, the maternal mortality was 33 per cent and the infantile mortality was the same.

Version.—In Veit's series of 87 version cases, the maternal mortality was 64 per cent and the infantile mortality 82 per cent.

In myoma cases there seems to be a marked tendency to ADHERENT PLACENTA. In a series of 147 cases of myoma complicating labor, manual removal of the placenta was necessary in 21 cases, and 13 of these women died. This serves to call attention to the difficulties of this condition, which is always a serious one in the presence of a myoma.

Caesarean Section.—In Saenger's series of 43 cases, the maternal mortality was 83.7 per cent and in Pozzi's 28 cases the maternal mortality was 86 per cent. In 48 Porro operations in fibroid patients, the maternal mortality was 33 per cent. In a later series of 49 cases of the Porro operation in myoma patients, the maternal mortality was only 12.5 per cent, showing that immediate removal of the myomatous uterus is the safe operation.

2. **Myomectomy.**—The patient is subjected to operation for the removal of the tumor, but the pregnancy is allowed to continue—if it will. Leopold in his myomectomies in the pregnant uterus, from 1884 to 1894, had a maternal mortality of 17.4 per cent and a fetal mortality of 37.6 per cent. Stavely had a maternal mortality of 24.2 per cent. The probability of abortion is great and must never be lost sight of, though many cases of extensive myomectomy have recovered without abortion. Olshausen reported 21 myomectomies. Abortion followed in 38 per cent. In a series of 57 myomectomies and enucleations during pregnancy, 12 per cent of the women died and 24 per cent aborted.

3. **Hysterectomy.**—The myomatous uterus is removed in early pregnancy. In a recent series of 89 cases of supravaginal hysterectomy for myoma complicated by pregnancy, the mortality was 11 per cent. When the operation is carried out promptly (before serious complications intervene) the mortality is very little higher than hysterectomy in the nonpregnant.

4. **Induced Abortion.**—As the patient is in a serious condition and her life threatened, the plan of emptying the uterus has been suggested and carried out. Lafour collected 39 cases of myoma and pregnancy in which this method of treatment was employed. The mortality was 36 per cent. In the case of a myomatous uterus the dangers from abortion (spontaneous or induced) are great, because of the difficulty of completely emptying the uterus and the consequent frequency of hemorrhage and sepsis.

Selection of Treatment

The treatment to be employed depends on the size and location of the myoma and the stage of pregnancy at which the patient is seen.

When the tumor is in the upper part of the uterus and is of small or medium size and not causing much trouble, it should be let alone until after parturition.

When the tumor is so large or so situated (cervix myoma) that it precludes the possibility or probability of full-term delivery per via naturalis, the treatment turns somewhat on the stage of pregnancy. If the patient is seen in early pregnancy, hysterectomy is the safest plan of treatment. In some exceptional cases the tumor may be so situated that myomectomy (abdominal or vaginal), with hope of continuing the pregnancy, is justifiable.

If the patient is seen, for the first time, in late pregnancy, it may be advisable to postpone operation until full term or nearly full term, with the hope of saving the child by caesarean section.

Of course, there are all gradations in seriousness, from the cases where it is almost certain that there will be no trouble to the cases in which full-term delivery by the natural route would be absolutely impossible. It is the middle class that contains the cases that furnish the most puzzling problems. When seen in early pregnancy there is an uncertain factor, namely, the probable extent of development of the myoma during pregnancy. This makes it difficult in some cases to decide just which line of treatment is preferable. In cases of doubt after giving due consideration to the various aspects of the case, the rule is to await developments.

A numerous class of myoma cases complicated by pregnancy, is that in which the patient has one or more myomata that give no particular trouble until she becomes pregnant. After the patient has been pregnant three or four months the symptoms become so acute and threatening that the tumor and uterus must be removed or the uterus must be emptied, with the dangers incident to miscarriage in these cases (see above) and the probability of operative removal of the tumor and uterus later. Immediate hysterectomy is the safest plan under these circumstances.

LIPOMA OF THE UTERUS

Lipoma of the uterus is rare, so rare as to constitute a curiosity. A few cases have been reported. It may come without particular cause, as in other situations, or it may come from fatty degeneration of a myoma. The symptoms and treatment are practically the same as for myoma. The exact diagnosis is made after the mass is removed and laid open.

CHAPTER IX

MALIGNANT DISEASE OF THE UTERUS

Malignant disease of the uterus occurs in the form of carcinoma and sarcoma. Carcinoma of the cervix uteri is so different clinically from carcinoma of the corpus uteri, that it seems advisable to consider the two separately. The subject of this chapter then may be divided into three parts, as follows:

Carcinoma of the Cervix Uteri
- Squamous-celled Carcinoma (Epithelioma).
- Cylindrical-celled Carcinoma (Adenocarcinoma).
- Malignant Adenoma.
- Endothelioma.

Carcinoma of the Corpus Uteri
- Adenocarcinoma.
- Malignant Adenoma.
- Endothelioma.
- Chorioepithelioma.

Sarcoma of the Uterus (Cervix and Corpus)

CARCINOMA OF THE CERVIX UTERI

This term signifies malignant disease of epithelial origin, situated in the cervix. It may arise from the squamous epithelium covering the vaginal surface of the cervix, in which case it is a squamous-celled carcinoma and is ordinarily designated as "epithelioma." It may arise from the glandular epithelium in the interior of the cervix, in which case it is a cylindrical-celled carcinoma and is ordinarily designated as "adenocarcinoma."

Etiology

The cause of carcinoma, as of other forms of new growth, is still a mystery. As in the case of myoma, there are some interesting theories but they are still theories only.

Pathology

Cancer of the uterus is, in the beginning, essentially a local process. The apparently independent growths appearing later in various organs, are simply metastases from the primary tumor. This fact has been firmly established by the most thorough and painstaking investigation by many authorities. The supposition that it is simply the local manifestation of some constitutional

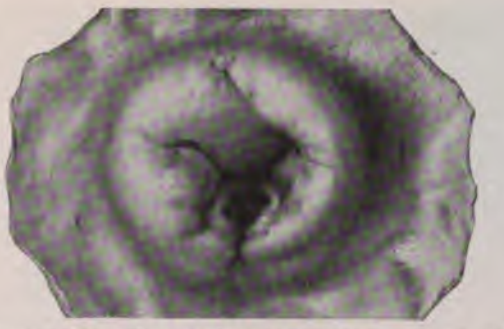


Fig. 668.—Drawing from a specimen of an early squamous carcinoma, or epithelioma, of the cervix. Notice that it has begun at one of the angles of the stellate tear. Gyn. Lab.

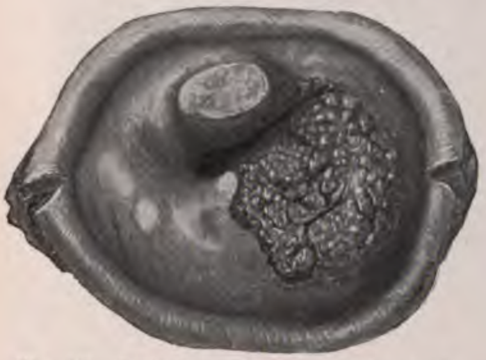


Fig. 669.—Beginning epithelioma of the cervix. (Sampson—*Johns Hopkins Hospital Bulletin.*)

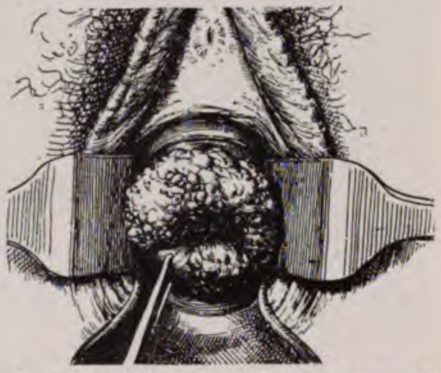


Fig. 670.—Epithelioma of the cervix, appearing as a papillary growth. (Kelly—*Operative Gynecology.*)

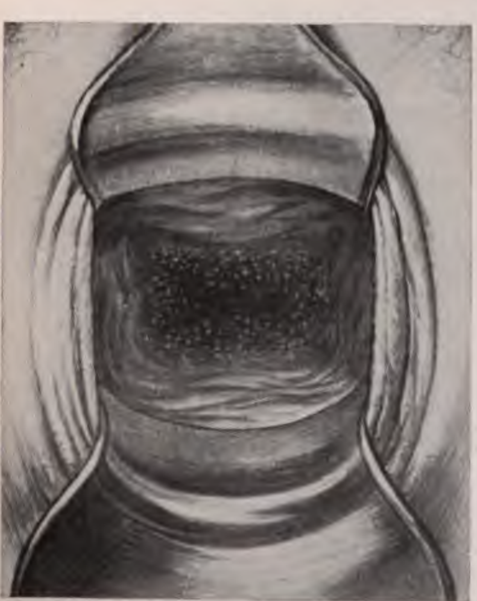


Fig. 671.—Epithelioma of the cervix. The cervix has been destroyed, leaving only an area of cancerous ulceration at the top of the vagina. (Kelly—*Operative Gynecology.*)

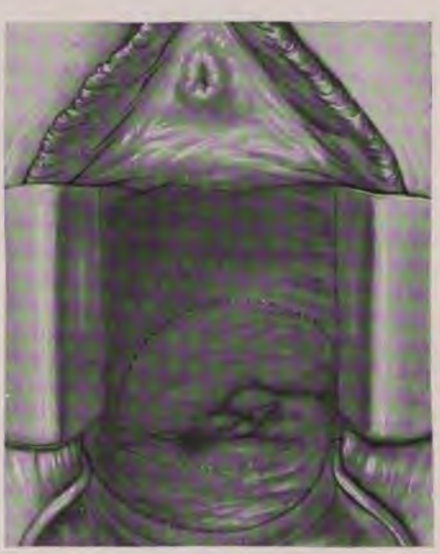


Fig. 672.—Epithelioma of the cervix. The cervix has been destroyed and the affected area has been drawn in, by the gradual contraction of the infiltrated tissues, until no cancerous tissue can be seen. Palpation, however, shows that there is infiltration of the area enclosed within the dotted line. (Kelly—*Operative Gynecology.*)

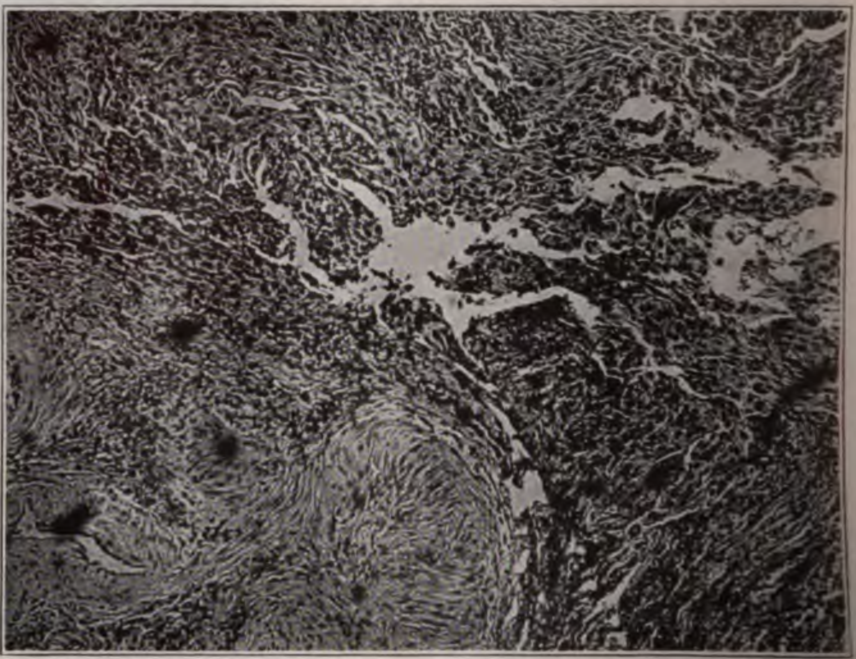


Fig. 673.—A diagnostic clipping from a cervix, showing squamous carcinoma. It was an early case and a radical operation was done. Fig. 674 shows the extent of the growth in the removed uterus. Gyn. Lab.

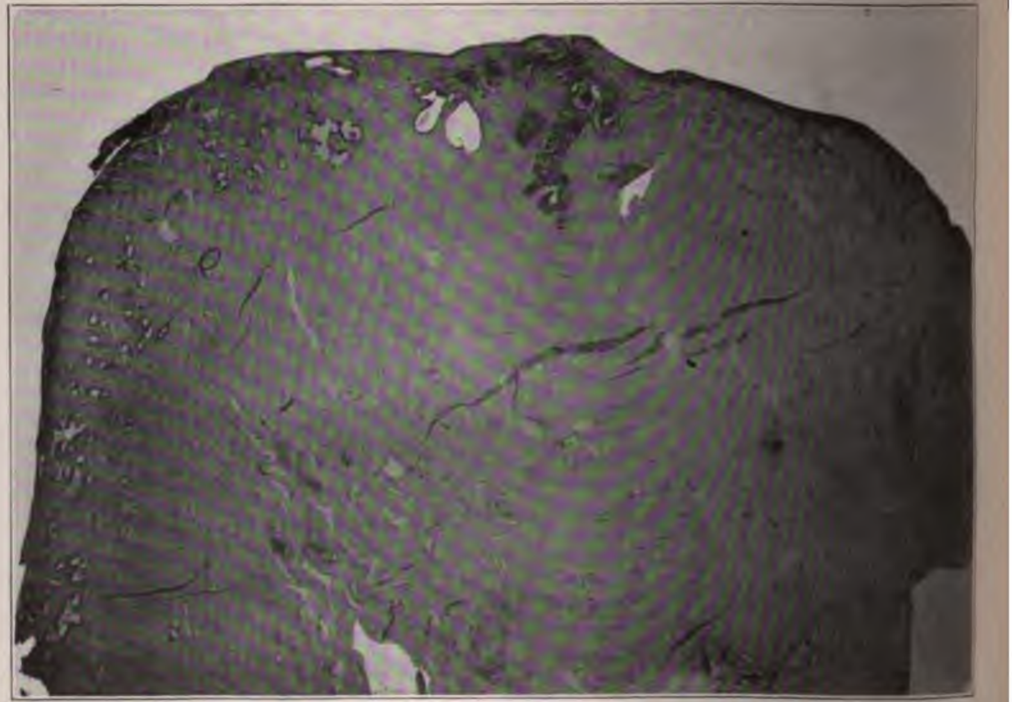


Fig. 674.—A very early squamous carcinoma of the cervix uteri. At the left is seen the wall of the cervical canal, with the cervical mucosa and glands. At the upper left angle is the external os and the beginning of the squamous epithelium. In the center of the upper part is the early squamous carcinoma. Gyn. Lab.

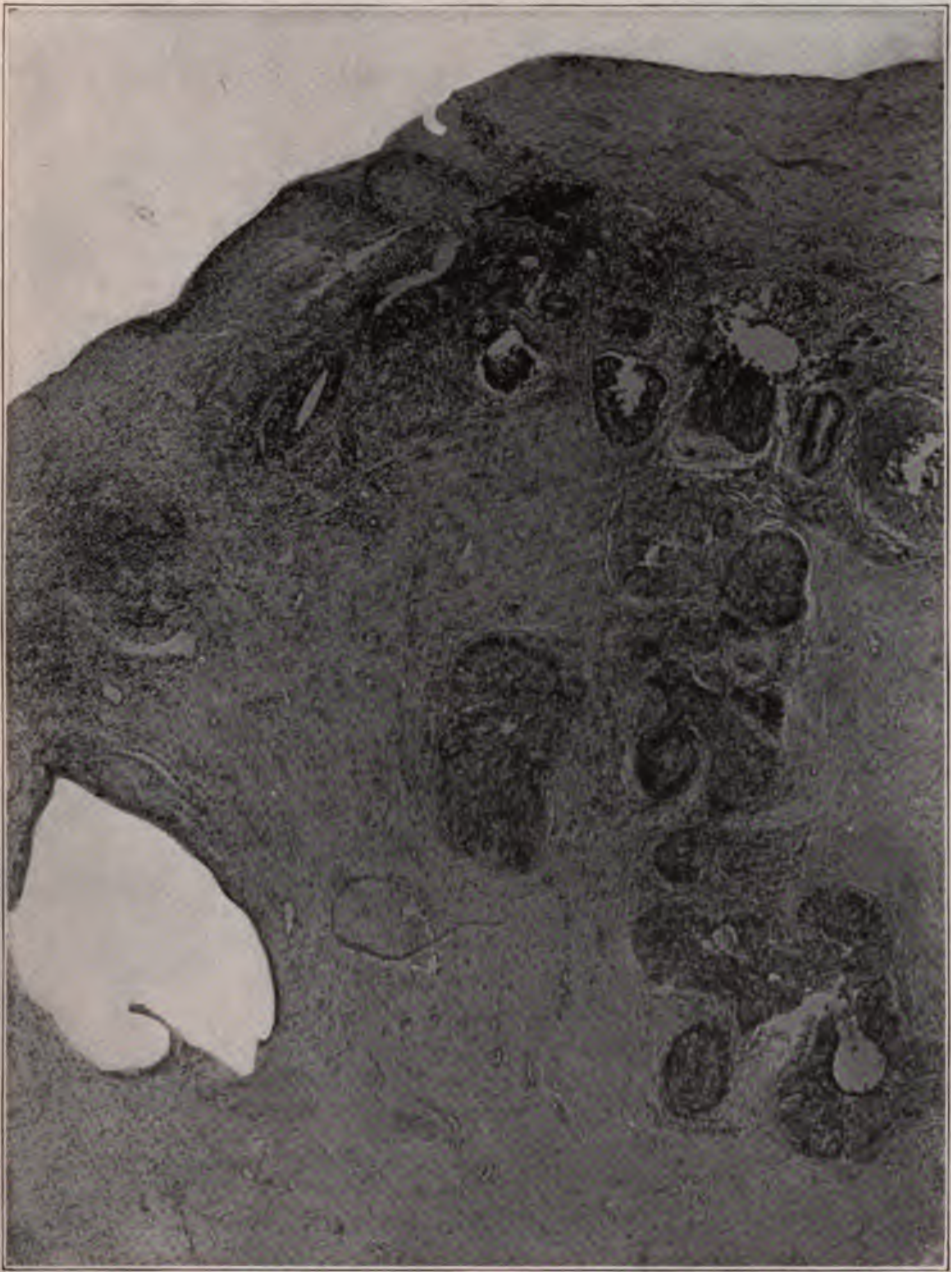


Fig. 675.—High power of the carcinomatous area in Fig. 674. Gyn. Lab.

dyscrasia, has no foundation. The important bearing of this on treatment is apparent.

Frequency.—As far as known at present, primary carcinoma occurs more frequently in the uterus than in any other organ, carcinoma of the stomach coming next in frequency. Welch found in a series comprising 31,000 carcinoma cases that the primary growth was in the uterus in approximately 29 per cent and in the stomach in 21 per cent.

Most carcinomata of the uterus occur in the cervix. Cullen, in a strict analysis of his 128 cases of carcinoma of the uterus, found that 74 were epitheliomata of the cervix, 19 were adenocarcinomata of the cervix and 35 were adenocarcinomata of the corpus uteri. The great frequency of carcinoma in the cervix is supposed to be due largely to injuries there in child-bearing, with resulting scar-tissue, inflammation, cystic degeneration and chronic irritation. It is rare in the uninjured cervix, though some cases have been reported, even in children.

Varieties.—Carcinoma of the cervix occurs in two principal forms—epithelioma (squamous-celled cancer) and adenocarcinoma (cylindrical-celled cancer), the epithelioma being by far the more frequent (74 to 19 in Cullen's cases).

Epithelioma of the cervix originates from the squamous epithelial cells covering the vaginal portion. Arising from that part of the cervix known as the "portio vaginalis," it is sometimes spoken of as "cancer of the portio."

The disease begins as a small area of infiltration on the vaginal surface of the cervix, supposedly at a point of persistent irritation from scar-tissue or erosion or other irritating process. If the patient happens to be examined at this stage, the infiltrated spot feels rather firm to the touch. That is all. There is no pain, there may be no bleeding or discharge, though there may be some discharge from the preceding chronic irritation. So far as the naked-eye appearance is concerned, it does not differ materially from a small area of chronic inflammatory infiltration or erosion. The essential pathologic change is that, at the point indicated, the squamous epithelium is beginning to penetrate into the underlying connective tissue (Figs. 673 to 675). This invasion is resisted by the leucocytes which collect in the adjacent tissue. As the process continues, the carcinomatous infiltration, with the opposing round-celled (leucocyte and lymphocyte) infiltration, penetrates deeper into the tissues and the small area of induration gradually increases in extent. A small abrasion or ulcer appears (Figs. 668, 669). This usually bleeds slightly when touched. Frequently the first evidence of anything wrong that the patient notices, is a slight streak of blood or spot of blood after coitus or after extra walking or other exertion. This may remain the only external evidence of the disease for many months—in fact, in a considerable proportion of the cases, no other symptoms appear until the disease has penetrated deeply into the cervix and out into the parametrium.

As the disease extends in the cervix, more infiltration becomes appreci-

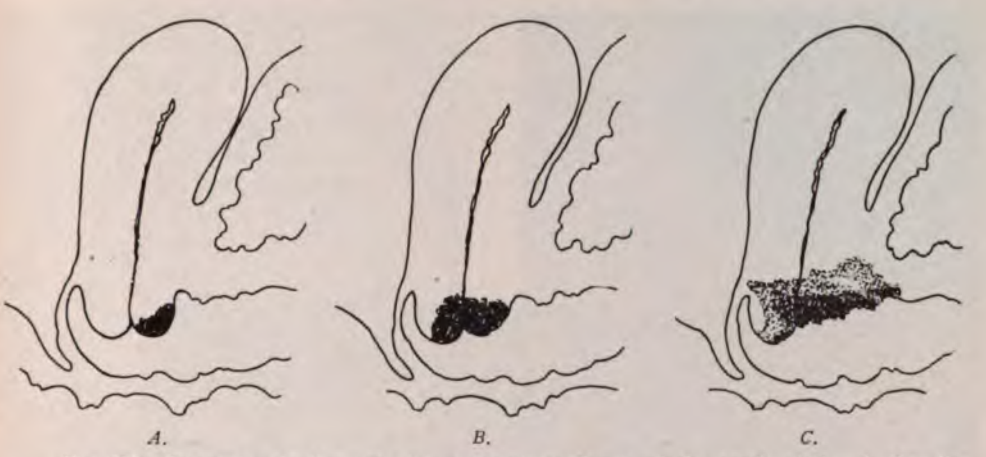


Fig. 676.—Progressive development of a squamous carcinoma of the cervix uteri. *A*, One lip only involved. *B*, Extension throughout greater part of cervix. *C*, Extensive involvement of pericervical tissues.

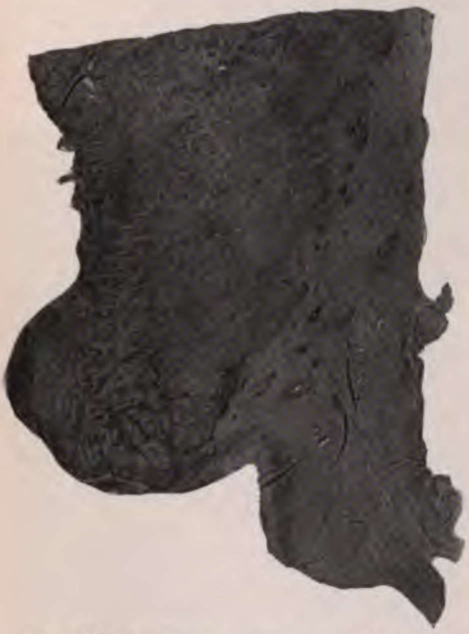


Fig. 677.—Squamous carcinoma involving the entire thickness of the cervix and spreading to the adjacent tissues to the right. Section shows one side of the vaginal portion of the cervix (to left) and attached vaginal wall (to the right). Gyn. Lab.

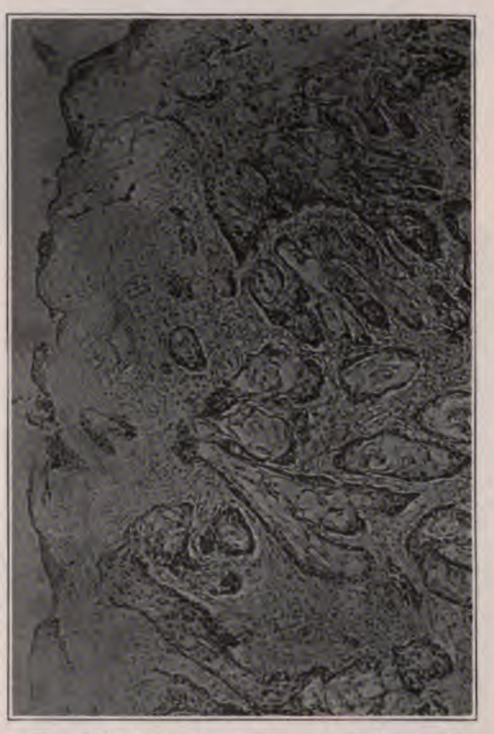


Fig. 678.—Squamous carcinoma of the cervix, showing the penetrating columns of carcinoma cells. The ulcerated surface of the cervix is at the left edge of the photomicrograph, and beneath this surface the cell columns are penetrating to the right. Gyn. Lab.

able on palpation and more ulceration (which may be mistaken for laceration or erosion) may be seen through the speculum (Fig. 671). The disease is continuously progressive, the destructive cells penetrating more and more of the surrounding healthy tissues (Figs. 676 to 681). Particles are also carried to adjacent lymph glands (Figs. 682, 683).

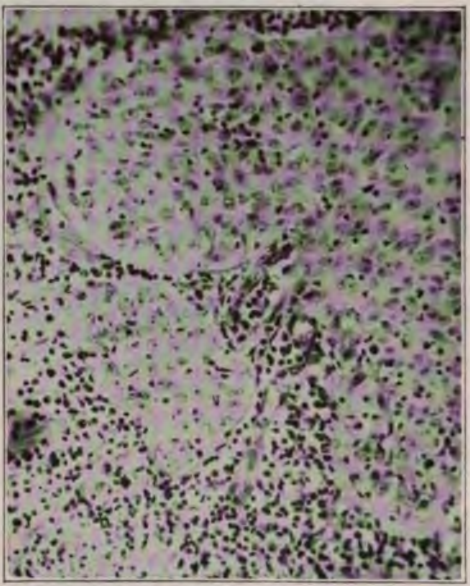


Fig. 679.—High power of a penetrating cell column. From the case of squamous carcinoma of the cervix shown in Fig. 678. Gyn. Lab.

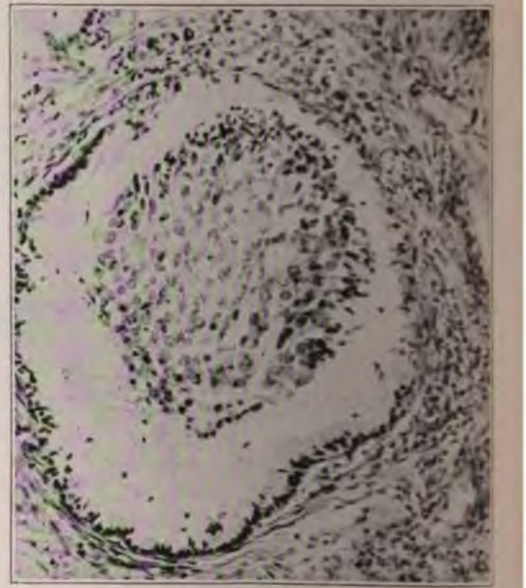


Fig. 680.—A carcinomatous plug growing within a cervical gland, the walls of which do not yet show carcinomatous change. From a squamous carcinoma of the cervix. Gyn. Lab.

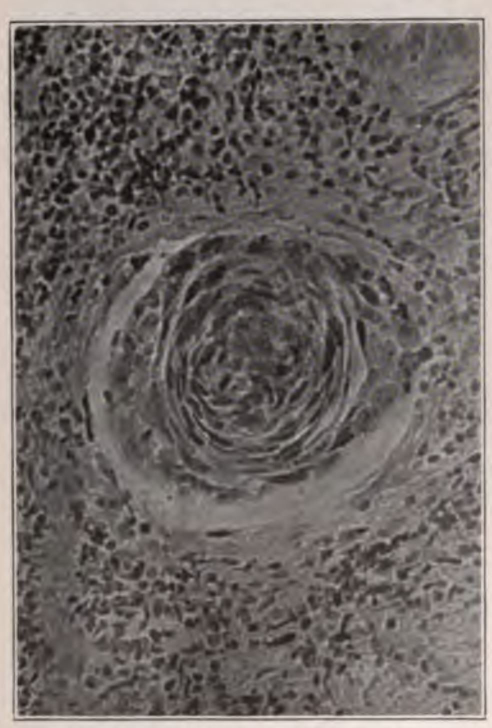


Fig. 681.—An epithelial pearl from a squamous carcinoma of the cervix uteri. Gyn. Lab.

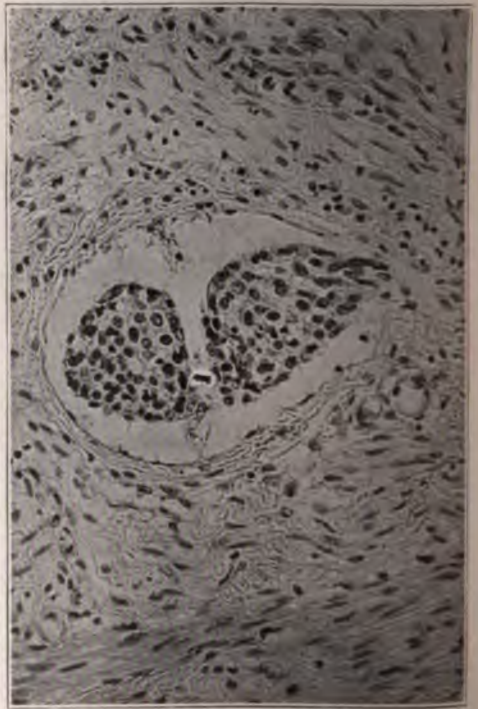


Fig. 682.—A group of carcinoma cells in a lymph channel. From a squamous carcinoma of the cervix. Gyn. Lab.

In addition to the regular and essential elements of the diseased tissue, there are secondary changes. Areas of softening and degeneration occur in which the cells are broken down and become simply fluid and debris. Hemorrhage into certain parts of the growth may occur and, as a result of that hemorrhage there remain clots and discoloration and fluid. Infection may take place, leading to suppuration or sloughing. Occasionally lime salts are deposited in the cancer cells. This chalky deposit may be extensive and may even be found in the metastases.

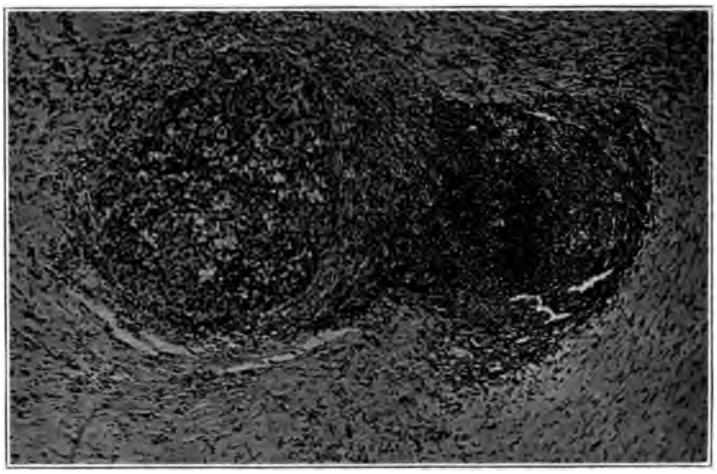


Fig. 683.—Carcinoma cells in a lymph gland of the internal iliac (hypogastric) group. Metastatic from a squamous carcinoma of the cervix. Gyn. Lab.

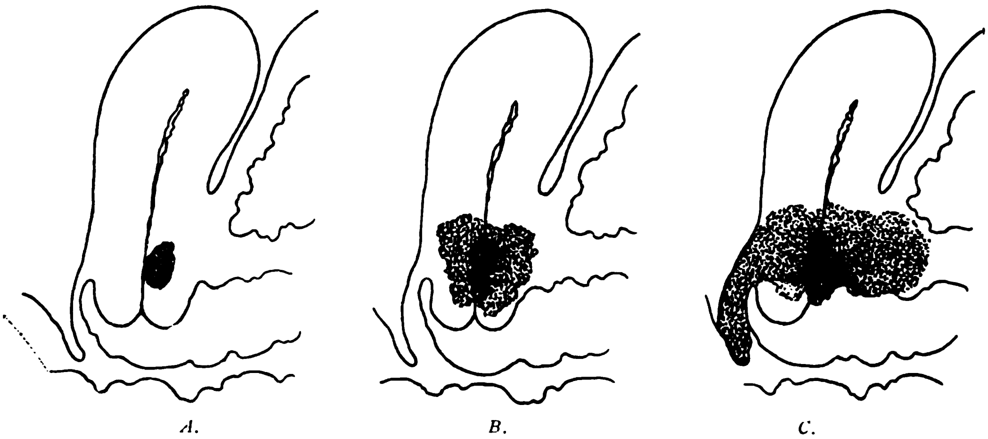


Fig. 684.—Progressive development of an adenocarcinoma of the cervix. *A*, originates from a gland within the cervix, in contradistinction to squamous carcinoma which originates from the squamous epithelium on the vaginal portion. *B*, Extension throughout the greater part of the cervix. *C*, Extensive involvement of pericervical tissues.

As the disease advances, projecting growth may occur, causing distinct papillary outgrowths on the affected portion of the cervix (Fig. 670). Still later the cervix may be replaced by a papillary fungus tumor-mass (Figs. 677, 692). On the other hand, particularly in the aged with very slow-growing epitheliomata, the formation of contracting scar-tissue may so draw in the affected region that it cannot be seen. In such a case it can be appreciated only by palpation, which reveals induration at the vaginal vault (Fig. 672). All this time the growth is extending out into the parametrial tissues towards the adjacent organs and the pelvic wall.

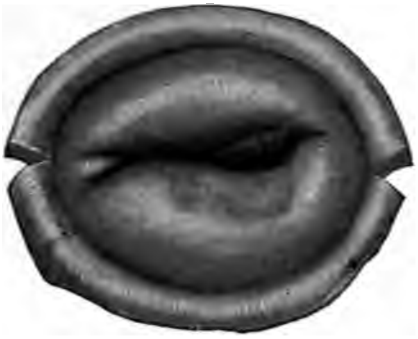


Fig. 685.—Beginning adenocarcinoma of the interior of the cervix. A small swelling appears at the widened external os. (Sampson—*Johns Hopkins Hosp. Bull.*)

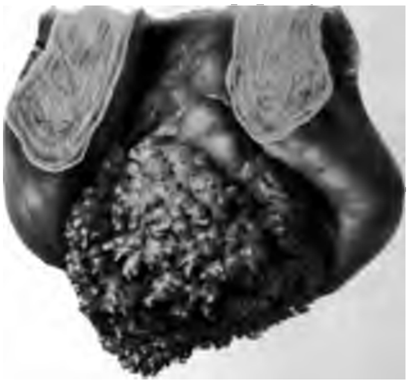


Fig. 686.—Drawing from an adenocarcinoma of the cervix forming a small projecting papillary mass. Part of the cervix has been removed to show the connection of the papillary mass with the cervical wall. Gyn. Lab.

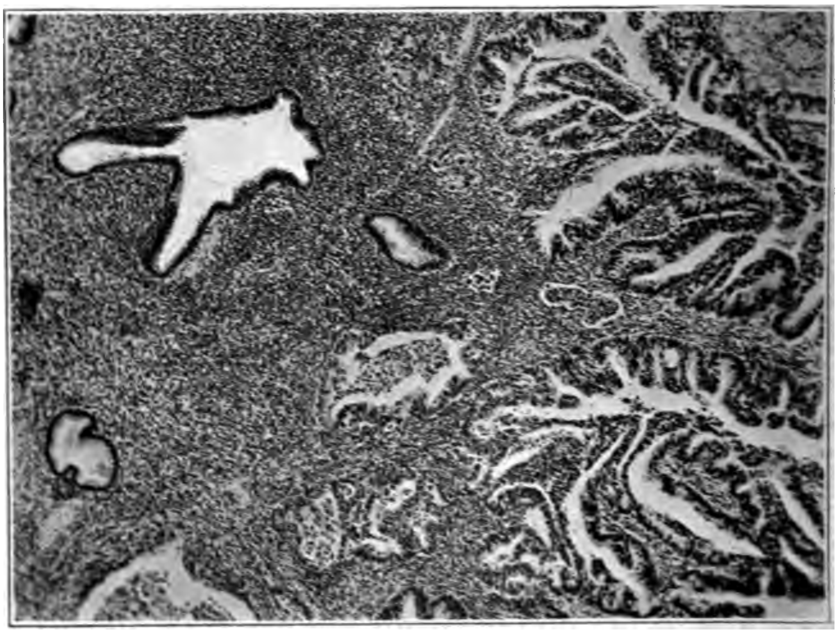


Fig. 687.—Adenocarcinoma of the cervix uteri. The photomicrograph is from the growing edge. Notice [illegible] in the same field. Gyn. Lab.

Adenocarcinoma of the cervix arises from the cylindrical cells lining the interior of the cervix and forming the cervical glands. It may then in the beginning be located near the external os in the cervical canal or in any part of a gland extending deeply into the cervical wall (Fig. 684 to 686). As the cell-columns penetrate the underlying tissues, the cells assume somewhat a gland formation owing to this derivation from gland-forming epithelium (Figs. 689 to 691). This gland formation, however, is very irregular and atypical, being represented to a large extent only by solid columns of cells.

The infiltration in adenocarcinoma, being situated in the interior of the cervix, is not appreciated by the examining finger until a considerable mass has formed (Fig 684). The disease pursues much the same general course as described for epithelioma, the carcinoma cells penetrating deeper and deeper into the cervix and into the surrounding connective tissue (Figs. 689 to 691).

Endothelioma is a rare form of malignant disease of the cervix in which microscopic examination shows spaces lined with proliferating cells resembling endothelium. Its exact nature and origin have not been determined—in fact, it is still uncertain whether it is an epithelial growth (carcinoma) or a connective-tissue growth (sarcoma).

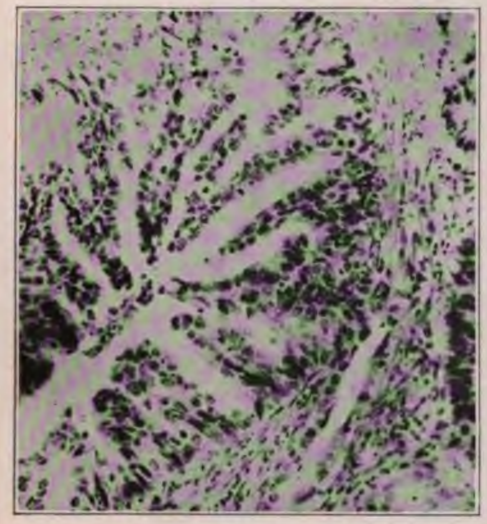


Fig. 688.—Adenocarcinoma of the cervix. High power from the section shown in Fig. 687. Notice the gland-like formation and the piling up of masses of cells with nuclei that vary greatly in size and staining qualities. Gyn. Lab.

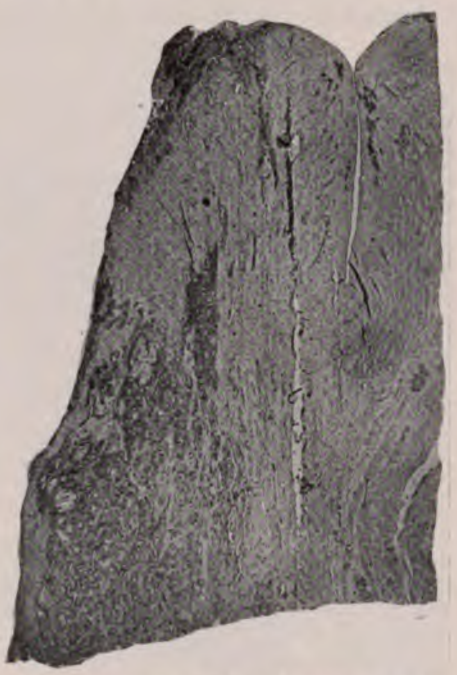


Fig. 689.—Section of half of cervix with the adjacent cervicovaginal fold (at right upper portion). The external os is at the left upper angle. At the left lower portion, far up in the cervical canal is an adenocarcinoma which is spreading from this point toward the outer portion of the cervix and adjacent subvaginal tissue. Gyn. Lab.

Modes of Extension.—Carcinoma of the cervix extends in four ways—by continuity of tissue, by lymphatics, by the blood stream and by implantation.

Extension by **continuity of tissue** is the principal method and, aside from exceptional cases, the only method in the earlier stages of the growth. In this method of extension, the carcinoma cells grow into the tissues against which
liffers markedly from the way in which a nonmalignant tumor
ıa as it grows, pushes aside the adjacent tissues, but a

malignant tumor as it grows *penetrates* the adjacent tissues and destroys them (Figs. 675 to 693).

It is this insidious involvement of the contiguous tissues that makes many cervical carcinomata inoperable when first seen. It is this same gradual extension outward by continuity of tissue that later causes the patient most of her suffering and that in most cases causes her death, by involving the uterus or bladder or rectum.

In extension **through the lymphatics,** some carcinoma cells are caught in the lymph current and carried to lymphatic glands (Figs. 682, 683), where they lodge and grow and destroy tissue the same as the parent growth. This invasion of the lymphatic glands by carcinoma cells does not occur usually until rather late in the disease—until it has extended by continuity of tissue through the cervix into the parametrium.

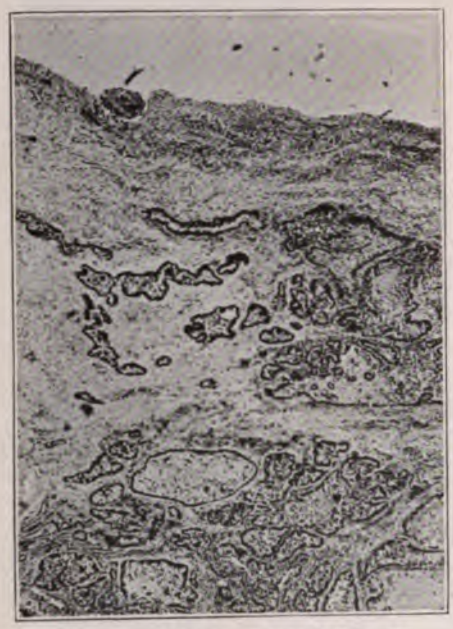


Fig. 690.—Higher power of Fig. 689. The carcinoma cells are markedly degenerated on account of a recent radium application. Gyn. Lab.

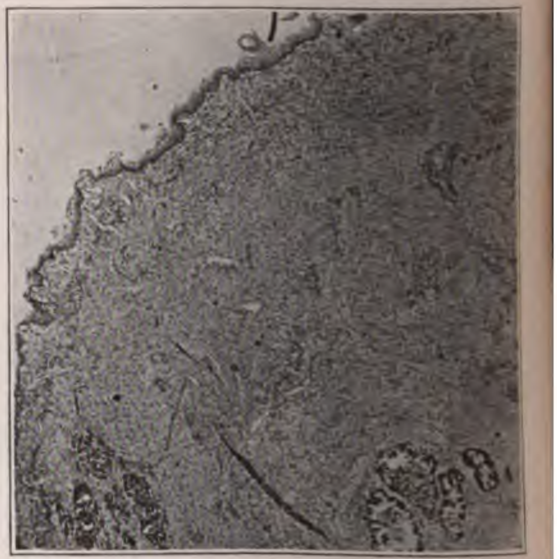


Fig. 691.—Vaginal wall from right portion of Fig. 689, showing underlying carcinoma cells. Gyn. Lab.

Winter found cancerous glands in only 2 cases in 44 autopsies on patients where the disease was confined to the uterus. Wertheim, in 60 operated cases, found involvement of removed glands in 15 per cent of early cases and in 31.7 per cent of all cases. Schauta made a most thorough autopsy-study of 60 cases, in 40 of which the patients died from the natural effects of the cancer and in 9 from intercurrent affections. In 43.3 per cent of the whole series, the glands were entirely free of carcinomatous metastases. The lower (removable) glands alone were involved in 13.3 per cent, the upper (not removable) glands alone in 8.3 per cent and both lower and upper glands in 35 per cent.

Kundrat, in a study of 76 cases operated on by Wertheim, in which the parametrium was involved on one or both sides, found the glands entirely free of metastases in 71 per cent. The glands on one side were involved in 22 per cent, and the glands on both sides were involved in 7 per cent.

The glands are rarely involved until the cancer has advanced into the parametrium. Kundrat, in his analysis of 80 cases, found only four in which the glands were involved with the parametrium free.

Enlargement of the regional glands is very common in the early stage of carcinoma but this enlargement is, as a rule, not due to carcinoma cells but to the inflammatory hypertrophy that nearly always takes place in the glands draining a region that is subject to severe chronic irritation. In exceptional cases, however, the glands may become infected with carcinoma cells at an early stage of the disease.

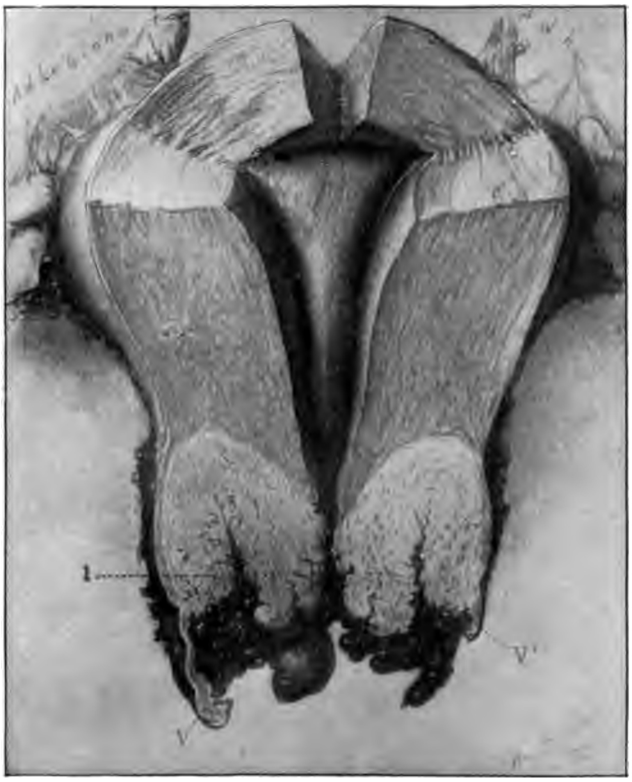


Fig. 692.—Advanced carcinoma of cervix (squamous type). (Cullen—*Cancer of the Uterus.*)

This matter of glandular involvement has a very important bearing on the question of operative treatment (Fig. 694).

In extension **by the blood stream,** some carcinoma cells penetrate into a blood vessel, are caught in the current and are carried to distant organs, where they lodge and grow and form metastatic tumors. In whatever kind of tissue these metastatic growths are situated, they reproduce the structure of the parent growth. The lungs are most frequently affected, though there are many other organs that are affected occasionally. The possibility of metastases must be kept in mind in deciding whether or not a case is operable. If metastasis to distant organs has occurred, hysterectomy would of course be useless, except as a palliative measure. However, such metastases hardly ever occur except in the last stage, and then not very frequently. Winter, in 202 cases, found metastases in distant organs in only 2½ per cent.

Direct Implantation of cancer cells into the healthy tissues of a raw surface takes place principally in operations for cancer—the cells being carried on the knife or scissors or other instrument, or on the fingers or sponges, from the infiltrated area to the healthy tissue which has been laid open in the operative work. Many undoubted instances of this occurrence are on record. It furnishes a strong reason for keeping entirely clear of the involved area in operations for the cure of cancer.

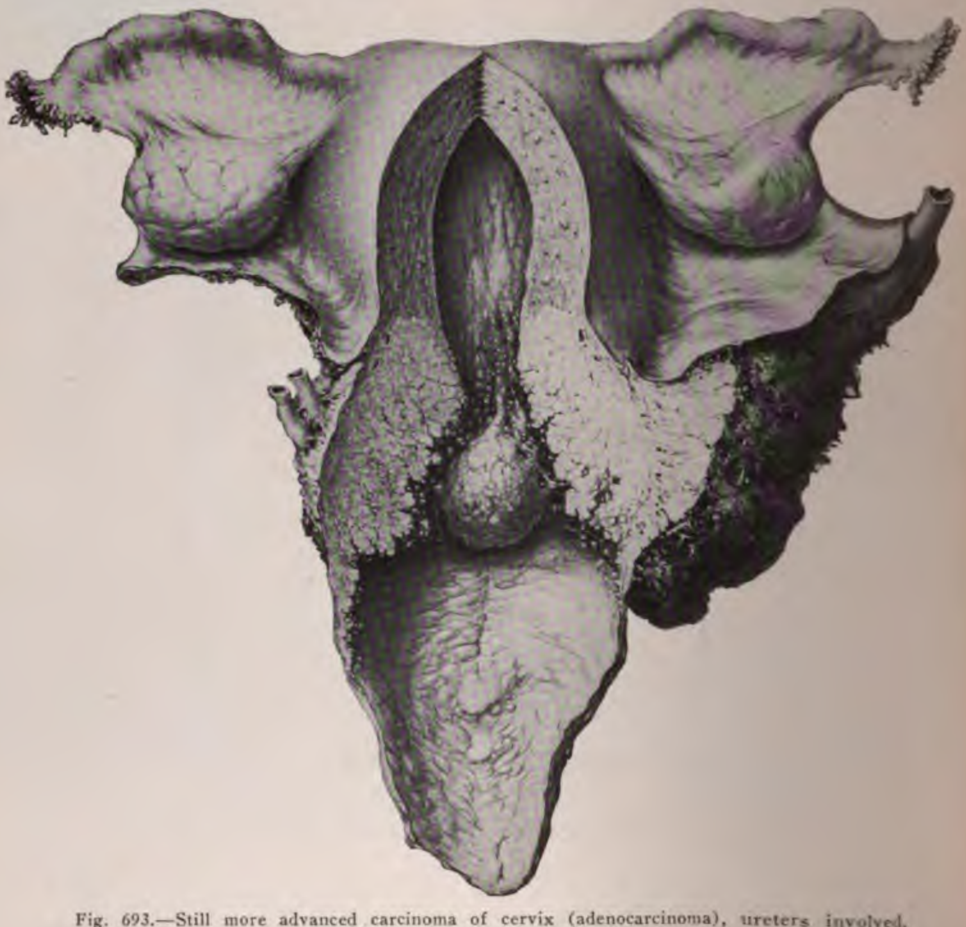


Fig. 693.—Still more advanced carcinoma of cervix (adenocarcinoma), ureters involved. (Kelly—*Operative Gynecology.*)

After carcinoma of the cervix becomes extensive, the two types (squamous-celled and adenocarcinoma) follow less destructive courses. The cervix is enlarged and indurated. The induration is principally at the periphery while the center usually presents a softened, bleeding area (Fig. 692).

The induration gradually extends and in time the pelvis becomes occupied by a firm fixed mass of infiltrated tissues (Fig. 693), involving the parametrium to the pelvic wall and the rectum and the bladder. In some cases the ureters are gripped and constricted (Fig. 697). Occasionally occlusion of the cervix by the growth with the infection accompanying it, leads to pyometra (Fig. 695).

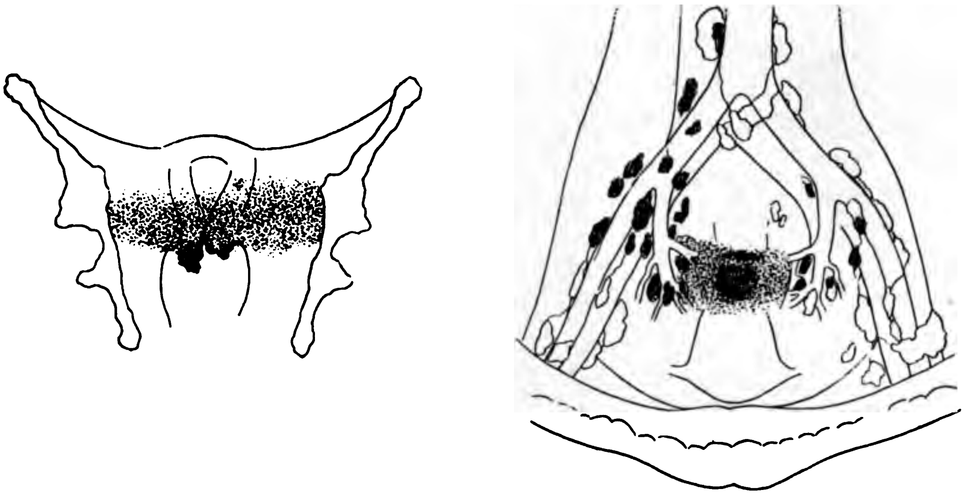

A. *B.*

Fig. 694.—Diagrammatic representation of pelvic extension of carcinoma of cervix uteri. *A*, Parametrial involvement extending out to the pelvic wall on each side. *B*, Involvement of the pelvic lymph glands. The general location of the different groups of glands is indicated by the dim outlines, and the involved portions by the dark areas. The internal iliac (hypogastric) group are usually the first involved.

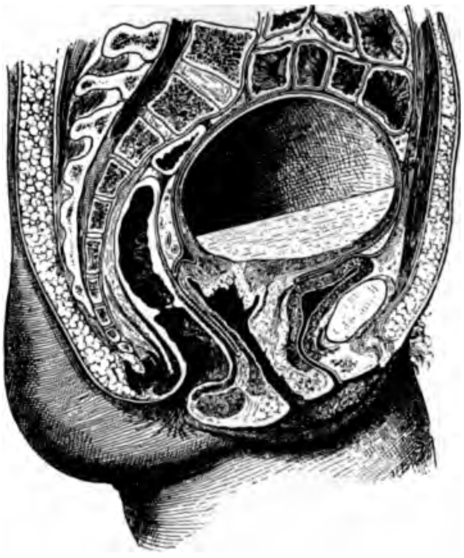


Fig. 695.—Uterus, enlarged by a collection of pus and gas (pyophysometra) above an occluded cancerous cervix. (Kelly—*Operative Gynecology.*)

In certain cases the carcinomatous ulceration extends into the bladder and into the rectum (Fig. 696), causing leakage of the contents of those organs into the vagina. In the later stages there may be compression of the pelvic nerves and vessels, causing severe suffering and persistent edema of the lower extremities. Compression of the ureters is another important late result (Fig. 697).

Associated Diseases, also, add to the pathologic picture in certain cases. Myoma of the uterus is a rather frequent association (Fig. 643). Various inflammatory lesions are frequent and add much to the danger and difficulties of treatment.

Duration of the Disease is variable, the limits ordinarily being one to three years. The duration depends somewhat on the KIND OF TUMOR (the softer the tumor the more rapid the growth), upon the AGE OF THE PATIENT (the younger the patient the more rapid the growth), and upon the PROXIMITY TO CHILDBIRTH—those carcinomata appearing within one year after parturition progressing very rapidly.

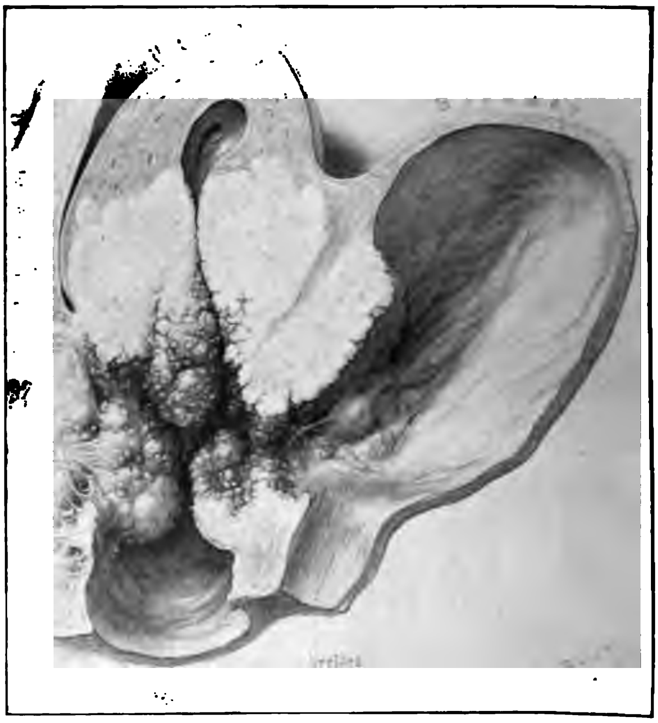


Fig. 696.—Case of carcinoma of cervix uteri (squamous type) which has extended into the bladder and the rectum, causing a fistula from each of those organs into the vagina. (Kelly—*Operative Gynecology*.)

These are only general rules, to which there are, of course, exceptions.

Effect of Pregnancy.—Sometimes carcinoma of the cervix may appear while the patient is pregnant, or occasionally pregnancy may take place in the early stage of carcinoma of the cervix. In either case the effect of pregnancy is to hasten the progress of the carcinoma. The softening of the tissues and the congestion associated with pregnancy, seem to favor rapid extension of the malignant disease.

Symptoms and Diagnosis

The first symptom, in practically all cases of carcinoma of the cervix is a slight leucorrheal discharge, with an occasional spot of blood. This slight streak of blood is seen usually after extra exertion (extra work, long walk, lifting) or after a douche or after coitus. It is especially liable to appear within 24 hours after coitus. A history of such "spotting" of the discharge or of the clothing calls for a most careful examination, that the presence or absence of carcinoma of the vaginal surface of the cervix or of the interior of the cervix, may be certainly determined.

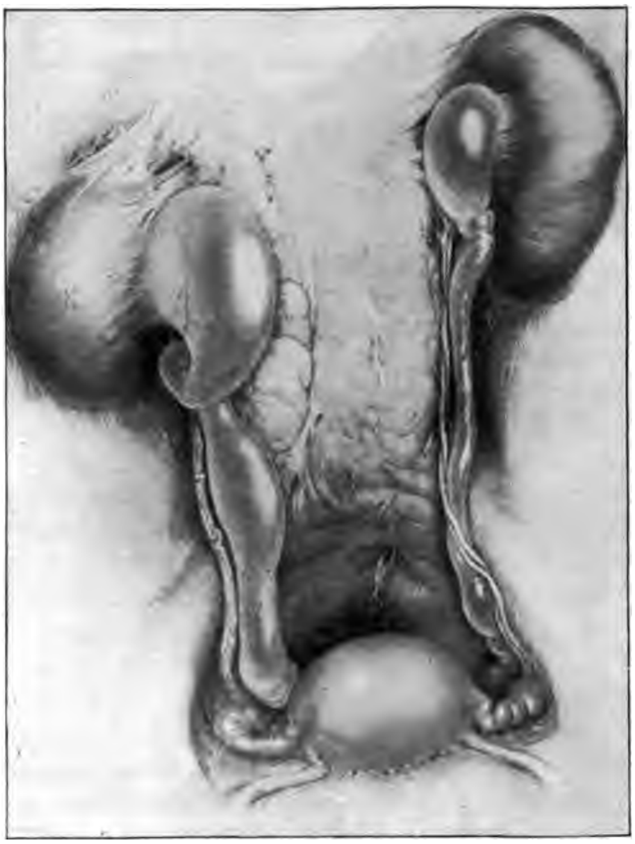


Fig. 697.—Case of carcinoma of cervix uteri in which the parametrial involvement has obstructed the ureters, causing serious dilatation of them and of the kidney pelves. (Kelly—*Operative Gynecology.*)

In giving the symptoms and the diagnosis of this disease, it is preferable to speak nearly altogether of the *early* stage. It is in this stage that the diagnosis is most difficult and it is in this stage that the diagnosis is most important, for efficient treatment then will, in a large proportion of the cases, save the life of the patient. Definite diagnosis in this early stage is dependent on microscopic examination of tissue from the suspicious area. Such being the case, it is just as well to take up at once a question which has troubled some persons, namely the

QUESTION OF METASTASIS FROM SPECIMEN EXCISION

The two important factors in saving a patient from death from malignant disease are, first, early diagnosis, and second, prompt and efficient treatment. Early diagnosis of cancer of the uterus depends on microscopic examination of an excised specimen of curettings. If the diagnosis is delayed until clinical symptoms and signs clearly indicate the nature of the trouble, it is probably too late to effect a cure even with the most radical treatment.

It has long been recognized that an incision through a cancerous area or curettage of the same, carries a certain amount of danger of spreading any infection present, including the cancerous infection. This long-recognized risk necessary in these serious cases and fairly well provided against in the technic, has been brought forward recently as a new discovery and one which contraindicates specimen-excision and diagnostic curettage in all forms of malignant disease. There seems at present to be considerable hysteria on this subject, amounting in some quarters to a phobia in which attention is focused on a single phase of the subject to the exclusion of other and more important phases. This serious condition is due largely to certain leaders in the profession who have permitted themselves to make loose statements, too sweeping in character or so ambiguous in construction as to promote erroneous interpretation.

There is unquestionably some danger in any incision, in spite of all the precautions of modern surgery. Specimen excision and uterine curettage are no exception to the rule. In a cancerous area there are cancer cells and usually infectious bacteria, consequently particular care should be taken to immediately seal opened lymph and blood vessels by thermic or chemical cauterization. With this precaution, I am satisfied that the danger of specimen excision or uterine curettage in a doubtful case is far less than the danger of not making such diagnostic excision or curettage.

For years gynecologists have been fighting for early diagnosis in uterine cancer. One of the essential features of such early diagnosis is microscopical examination of tissue removed for that purpose in doubtful cases. Many women who are alive today owe the preservation of life to such early microscopic diagnosis. And others have been saved from a serious and often fatal operation through the differentiation of their troubles from malignant disease. As before stated, there is some danger in any excision of tissue, but under proper precautions the danger of excision is so slight and the danger of delay so great, that to neglect this decisive diagnostic measure is to neglect a serious duty we owe to the patient. Furthermore, the evidence, at least the evidence that has come to my notice, indicates that the principal danger of an examination in promoting distant metastases or peripheral extension from a malignant growth, comes not from specimen excision but from the manipulation and squeezing of the growth. In an instructive article by Wood (Journal American Medical Association, Sept. 6, 1919) substantial experimental evidence is introduced. He found in animal experimentation that metastasis is increased, first, by the length of time the tumor is in the body, and second, by massage of the tumor. Diagnostic excision of tissue without massage had no appreciable influence in that direction.

The working conclusions of the author on this subject are as follows:

1. If in a doubtful case excision of tissue from the cervix or intrauterine curettage is necessary to an early differential diagnosis, it should be carried out at once, without unnecessary manipulation of the growth, and the opened lymph spaces should be immediately closed by thermic or chemical cauterization.

2. The effort to limit such diagnostic excision or curettage to patients on the operating table and prepared for radical operation, is doing harm. It excludes from early differential diagnosis that large class of doubtful cases in which the local disturbance is very slight and the patient hesitates to go through the expense and mental strain of preparation for the radical operation on the mere chance that there may be beginning malignant disease. And yet it is in just this very class that differential diagnosis is most effective in saving life.

The pernicious teaching referred to above is producing deaths by cancer not only by limiting diagnostic excision in the earliest cases, but also by leading to repeated manual examinations and manipulation of the suspicious area, in an effort to decide the diagnosis without tissue excision. Both reason and experimental evidence indicate that pressure manipulation of a cancerous area is much more productive of metastasis than simple excision of tissue or curettage with proper precautions.

DIFFERENTIAL DIAGNOSIS

When the cervix presents any departure from the normal, malignant disease must be definitely and certainly excluded. The method of exclusion varies in different cases, depending on the conditions present. In some cases, excision of a specimen of tissue is necessary, in others it is not necessary. The point is, that by some means, the differential diagnosis must be made with certainty within a reasonable time. There must be no temporizing and aimless "local treatment" of uncertain lesions in this region of danger.

The prompt differentiation of a suspicious lesion in this locality is so important a matter that it is advisable to take considerable space to emphasize it and give details. In this connection it will be an advantage to consider the differential diagnosis between the early stage of malignant disease of the uterus *in general* (both carcinoma and sarcoma) and the conditions with which it is likely to be confused. This is a very important subject, particularly to the general practitioner who usually sees the patient first and upon whom rests the responsibility of recognizing malignant disease in its beginning, or of recognizing the cases in which it may be present and which require special investigation accordingly.

Malignant trouble is invariably **chronic** and there is always present either **induration** or **ulceration.**

In the CERVIX, if there is induration it can be felt. If there is ulceration or erosion of the outer surface of the cervix, it can be seen. If there is ulceration within the cervical canal, it will cause a troublesome discharge.

In the BODY of the uterus, if there is ulceration it will cause a troublesome discharge. By "troublesome discharge" is meant what is ordinarily called "leucorrhea"—not the watery discharge of advanced cancer. Induration in the body of the uterus cannot, of course, be detected until a considerable mass has formed. However, practically every case of malignant disease of the body of the uterus, whether carcinoma or sarcoma, presents a discharge while the infiltration is still in an early stage.

In forming a conclusion as to whether or not a lesion is malignant, we should not give too much weight to the youth of the patient. To be sure, in carcinoma the patient is usually past thirty-five. But carcinoma may occur before thirty. One patient for whom the author did an abdominal hysterectomy for carcinoma was but twenty-eight and the disease had then been present long enough to form a large mass and had been giving her much trouble for several months. Several cases of this disease in patients under twenty have been reported. Sarcoma may develop at any age.

Called to see a patient with pelvic disease, if there is no erosion or ulceration of the cervix, no induration of the cervix or body of the uterus, and no chronic pathologic discharge, we are safe in assuming that the uterus is free from malignant trouble. When any of these signs are present we must make a **differential diagnosis.**

Induration in the Cervix may be due to cystic disease or to scar-tissue from laceration or to a fibroid or to malignant disease.

In **cystic disease,** if the nodule be punctured and then pressed upon the characteristic clear glairy substance will be extruded and the induration will largely disappear. If there remains enough induration to make the diagnosis doubtful, excise a small wedge-shaped piece and submit it to a pathologist for examination.

In **scar-tissue** from laceration, the induration is limited to the site of injury and the cause is plain. Also in scar-tissue the area of induration remains practically the same, whereas if malignant the area of induration gradually increases. In this case, as in every other, if there is reasonable doubt after a short period of careful observation, excise a piece for microscopic examination.

In **myoma** of the cervix, myomata elsewhere in the uterus may often be detected, making it probable that the nodule in the cervix is similar in nature. A well-marked tumor of the cervix, even a myoma, should be removed, for almost without exception a fibroid in that situation causes very troublesome symptoms. A small mass with no myomata elsewhere should have a piece excised to make certain the diagnosis (Figs. 673 to 675).

Ulcer or Erosion on Cervix.—An ulcer or a spot of erosion on the cervix may be due to an irritating discharge, to a pessary or other irritant, to eversion of the mucous membrane by laceration, or to tuberculosis, syphilis, chancroid or cancer. In the first two mentioned the lesion heals promptly on removing the cause.

When the **cervix is torn** so deeply that the mucous membrane is everted and granulating, the cervix should be repaired, and the tissue removed in the denudation for repair may be examined microscopically. If there is no malignant trouble, the cervix will be in much better condition than before, and we will have satisfied ourselves that it was only simple trouble and the patient need never know that there was a suspicion of malignancy. If malignant infiltration is found in the excised tissue the uterus can be removed at once with the probability of a permanent cure.

Tuberculous Ulceration of the cervix is rare. The diagnosis is made from microscopic examination of tissue excised from the diseased area.

In **Syphilitic Ulceration** there are usually other lesions or a history which makes the diagnosis clear. Furthermore, a syphilitic lesion of the cervix, whether primary, secondary or tertiary, should yield within a reasonable time to appropriate treatment, provided the patient's general health is not too much depressed.

Chancroidal Ulceration, which is thoroughly cauterized, should within a short time thereafter show healthy granulation and rapid healing. A sore on the cervix that resists appropriate treatment should have a piece removed for examination.

The following method of differential diagnosis has been proposed: Soak a pledget of cotton in 10 per cent copper sulphate solution and apply it, for a minute or two, to the suspicious surface. If the lesion is a simple erosion, a bluish-white coating will form without hemorrhage. By repeating the application at intervals of three or four days the erosion will soon be healed. If the lesion is an ectropion it will be blanched by the application. If the lesion is cancerous ulceration, the copper sulphate application will cause bleeding. A few days later another application is made, and if the bleeding is more free, the diagnosis of incipient carcinoma is almost certainly correct. Heitzman, who brings forward this method, states that he rarely failed to find microscopic confirmation of this provisional diagnosis. In all ulcerations except malignant, the bleeding is checked by a few applications of copper sulphate in solution, and the persistence of a single bleeding point after the rest of the raw surface is healed indicates malignancy and calls for a microscopic examination of tissue from the suspected area.

Discharge from the Uterus.—There still remain for differential diagnosis the diseases causing uterine discharge, and here is where the difficulties begin and where there have been so many failures. The term "many failures" is justified, for of the hundreds of women who annually die of cancer of the uterus a large number undoubtedly go to physicians during the early stages and are treated for chronic endometritis, over long periods, thus losing valuable time.

Taking up the differential diagnosis, we know that malignant disease is always *chronic*. So we can eliminate at once all the acute diseases, leaving only the following: CHRONIC ENDOCERVICITIS (septic, gonorrheal, and glandular), CHRONIC ENDOMETRITIS (simple, septic, gonorrheal and tuberculous), POLYPI and MYOMATA.

In differentiating these affections from malignant trouble, the effect of treatment is an important item. Inflammation of the uterus in any form is greatly benefited by appropriate treatment. Consequently every case of uterine disease presenting induration, ulceration, or discharge, should be subjected to careful and vigorous treatment for the purpose of differential diagnosis as well as for the purpose of effecting a cure.

Chronic Endocervicitis.—In suspected chronic endocervicitis, a very good plan is to give a hot antiseptic douche two or three times daily, and every second or third day apply 4 per cent silver nitrate solution, or tincture of iodine, to the cervical canal. If there is a marked congestion of the cervix, make multiple punctures. If the external os is so small as to interfere with drainage, open it by dilatation or incision. If there are cysts, puncture and evacuate them and touch the cavities with silver nitrate or tincture of iodine or carbolic acid. If there are polypi, remove them. If the cervix is hypertrophied and riddled with cyst, excise most of the diseased area and repair the cervix or partially amputate it.

Any tissue removed from the cervix, either curettings or polypi or pieces removed in denudation for repair, should be subjected to a microscopic examination in every case that is the least suspicious. The simple fact that cystic disease is present does not exclude cancer. Both may be present, and if the pathologic discharge persists after a course of treatment, a piece should be excised from the suspicious area.

Chronic Endometritis.—Hyperplasia of the endometrium is due usually to poor blood or a malposition or subinvolution or ovarian disturbance. Remove the cause, and, if the changes in the endometrium are not marked, they will subside spontaneously or after a few astringent applications. If the pathologic changes are marked, it is not sufficient to remove the cause but we must remove also the diseased endometrium, that a new and better one may develop under the bettered conditions. If the case is not perfectly plain, the scrapings should be examined microscopically that the diagnosis may be confirmed or disproved.

In chronic septic endometritis and in chronic gonorrheal endometritis, the idea of effecting a cure by long-continued intrauterine applications, repeated week after week and month after month, is a delusion and a snare. These long-continued applications rarely if ever effect a cure; they frequently cause extension of the inflammation [illegible], and worse still, they deceive the patient and the physician [illegible] that something is being done towards a cure, whereas, [illegible] progress is made against inflammation, and if malignant disease be present it is allowed to develop till it is past cure.

In all these cases [illegible] persists after a course of treatment [illegible] the uterus should be carefully cleaned [illegible]. Then if [illegible] inflammation, the patient is on a fair way to get well, and if the microscopic examination of the scrapings shows malignant disease (Fig. 169 to 171), the uterus can be removed in this early stage with a well-founded hope of saving the patient's life.

Myomata are frequently multiple, and when only a single tumor can be felt it may be of such large size or have existed so long with but little disturbance, that malignancy is excluded. But there are many cases in which the mass is small and so far as known has existed only a short time. In these cases the most important point in the differential diagnosis is the change that takes place in the endometrium in the two diseases. A myoma frequently causes a hypertrophic endometrium which gives rise to discharge and hemorrhage. A malignant tumor starting deep in the uterine wall may at first cause similar changes, but in the course of time and before it reaches a large size or passes beyond the limit of complete removal, it extends to the endometrium, and characteristic elements will be found in the uterine scrapings. Furthermore, the great majority of malignant growths of the body of the uterus *begin* in the endometrium and so produce characteristic changes there in the very earliest stage.

Therefore, in a case of small tumor of doubtful character, accompanied with discharge or bleeding, curettage is advisable as a means of diagnosis. If the uterine scrapings do not show malignant infiltration we are justified in assuming that the tumor is a myoma, but if the scrapings do show malignant infiltration the radical operation is, of course, indicated at once. Another point which should be kept in mind is that a malignant tumor which at first causes disturbance of the endometrium by pressure or proximity only, may later send its characteristic elements to the endometrium where they can be reached with the curet. Consequently, when the first examination shows nothing malignant, if signs of marked endometrial disturbance again appear, the diseased tissue should again be removed for examination.

In the later stages also of uterine tumors, curettage is valuable as a diagnostic means. For instance, a patient presents a large tumor of the uterus of doubtful character, with pain and discharge and marked disturbance of the general health. Curettage will lessen the hemorrhage and discharge temporarily and will furnish tissue for examination. If the scrapings show no malignant infiltration, the tumor is probably a myoma and removal may be indicated. If the scrapings do show malignant trouble, only palliative measures are indicated, as the growth has advanced too far for complete removal.

There remains still unmentioned one form of malignant disease that is most difficult of positive diagnosis. I refer to a malignant tumor GROWING IN A MYOMA or resulting from the degeneration of the same. In a number of well-authenticated cases, malignant tissue has been found in tumors that were undoubtedly for several years simple myomata. The cases are not very frequent but they do occur, and a myoma that takes on rapid growth at any time near the menopause is open to this suspicion. As the malignant infiltration is for a long time confined within the myoma, it does not reach the uterine canal, and a positive diagnosis can be made only by removal of the tumor.

In the **later stages** of carcinoma the pressure symptoms and other complications mentioned under pathology, develop and cause the patient much suffering. Cancerous CACHEXIA (a yellowish anemic color with emaciation, due to deterioration of the blood) appears, and also a FOUL DISCHARGE and PERSISTENT BLEEDING. If the cervix is involved, a fungating mass may be felt in the vagina.

In the differential diagnosis of cancer, the author purposely avoided giving prominence to these symptoms, for they represent a late stage of the disease. The diagnosis should be made before such symptoms develop, if the patient comes under observation in time.

In working for general early diagnosis of cancer of the uterus, we meet with one very serious difficulty which, probably more than any other, is responsible for the many deaths from this disease. It is the want of knowledge on the part of the public generally, as to the serious import of irregular blood-tinged vaginal discharges in women approaching the menopause. A very large proportion of patients with cancer of the uterus do not consult a physician until the malignant infiltration has advanced beyond cure. The disturbance in the early stage is so slight (just a slight leucorrhea streaked with blood occasionally) that the patient thinks it of no particular significance and neglects to have any investigation until too late.

Whenever an occasional streak of blood or spot of blood appears in a leucorrheal discharge, particularly in a woman approaching forty or older, an examination is urgently required, in order to determine certainly whether or not there is beginning cancer in the cervix or body of the uterus. Such women should seek medical advice at once, that the cause of the blood streak may be determined without delay. Education of the public in this matter is urgently needed and if carried on patiently and persistently and judiciously, will save thousands of women from death by uterine cancer. However, education of the public in this matter is an exceedingly hard task. Of course physicians, as individuals, can help by giving information to their patients. But there is a larger medium of publicity that should certainly be utilized in some way in a matter of such great importance to the public, namely, the public press and periodicals. This, however, is a delicate matter and one for concerted action only on the part of the profession as a body, and not for individual action. This phase of the subject is being considered in a practical way and some very definite and effective steps are being taken for the general dissemination of this much-needed information.

That much good can be accomplished by a systematic and sustained fight in this direction is shown by the results in East Prussia. Winter, aided by the professional, sociologic and governmental conditions there existing, carried on a most successful campaign against this disease. The report of the first year's work showed, among other things: (a) that the proportion of carcinoma patients who consulted a physician within three months after the appearance of symptoms, was raised from 32 per cent to 57 per cent; (b) that the proportion of patients operated on within two weeks after the first consultation, increased from 78 per cent to 90 per cent; and (c) that the operability in patients seeking treatment was raised from 62 per cent to 74 per cent.

Treatment

For purposes of treatment, the cases of carcinoma of the cervix are divided into two classes—operable and inoperable.

Operable Cases

This class comprises, theoretically, those cases in which the malignant disease is still limited to the uterus. Practically, it comprises those cases in which there is a good chance that the carcinoma is limited to the uterus and immediate vicinity and in which the patient is in condition, or can be put in condition, to stand the radical operation with reasonable safety. By "radical operation" is not meant any particular form of operation, but any operation that removes all the tissues likely to be involved in that particular case.

As to what tissues may be removed, by those skilled in pelvic work, that is well known. The removal of the uterus is the least that is to be done. In selected cases, the lower part of one or both ureters may be removed, or a part or the whole of the bladder, or a part or the whole of the rectum. Also, the pelvic connective tissue generally with its contained lymphatic vessels and glands, may be cleared out to the soft structures of the pelvic wall, and the enlarged lymphatic glands about the iliac vessels may be extirpated. The writer does not wish to be understood that any of these extreme measures should be employed in any case, but intends only to point out what *may* be done and the patient still survive in selected cases.

The question as to the *advisability* of such extensive operative work does not turn upon any question as to the possibility of removal of these structures, but, upon the probability that carcinoma cells have simultaneously extended to other and inaccessible regions. Careful investigations in this direction have been made and many extensive operations have been carried out, but the results so far have not been such as to encourage these extensive operations.

The lesson to be drawn from the work up to the present time, is that ordinarily recurrence is practically certain when the carcinomatous infiltration has extended so that it involves the bladder or the rectum or the outlying lymphatic glands or the connective tissue around the ureters. When any of these structures are evidently involved, it is almost certain that there are scattered carcinoma cells in adjacent deeper and inaccessible tissues, hence these cases lie outside the operable class.

How to Determine Operability

How extensive is the carcinomatous infiltration? That is the important question, for the answer determines whether or not the patient is to be subjected to radical operation. To determine this absolutely in any case is impossible. It may, however, be determined approximately. The signs upon which we must depend largely for determining it are the *induration* (occasioned by the infiltration of the tissues with carcinoma cells and opposing round cells) and the *fixation* of the uterus, which is present when the infiltration extends out to the pelvic wall.

When the uterus is not movable, it is then necessary to determine whether the fixation of the organ is due to malignant infiltration or to inflammatory infiltration. If the fixation is due to malignant infiltration, operation is not indicated. If the fixation is due to inflammatory infiltration, it is not a bar to operation.

The infiltration is **probably malignant** if it is in the lower part of the broad ligament and directly continuous with the carcinomatous area of the cervix, if it is not tender and if there is no history of recent inflammatory trouble and no evidence of the same in the pelvis.

The infiltration is **probably only inflammatory** if there is a mass about one or both tubes (salpingitis), if the infiltration of the broad ligament is mostly in the upper part, if the bladder and rectal walls are not involved and if the patient gives a long history of inflammatory trouble and a short history of cancer.

Operative Measures

In the operable cases, what operation should be chosen? In order to answer this question intelligently, let us see just what the operation must accomplish. In most of the cases the disease has passed the first stage before the patient consults a physician. There is already carcinomatous infiltration of the connective tissue near the uterus—not sufficient, perhaps, to be appreciated by the examining finger, but amply sufficient to cause recurrence. This infiltration of the parametrium in practically all cases that come to operation, is the cause of the lamentable failure of the old vaginal hysterectomy and the old abdominal hysterectomy as a cure for cancer of the cervix uteri. Occasionally a case was met within the first stage (simply a small ulcer on the vaginal portion of the cervix or a small nodule in the interior of the cervix), and in these cases the ordinary vaginal or abdominal hysterectomy removed all the involved tissue and resulted in cure. However, the general effect of these occasional good results was detrimental rather than otherwise, for they prolonged the reliance on these inadequate operations for the cure of the disease and postponed the devising of more effective operative measures.

When physicians began, after the lapse of some years, to count up the permanent cures from the operations mentioned, the results were most discouraging and disheartening. It was found that 5 per cent of cures was all that could be reasonably claimed. Some operators who had had many cases could not present one permanent cure, and a few lost all hope and claimed that the disease could not be cured by operation.

Careful investigation into the pathology of the disease brought out the cause of the failure of the operative measures then in vogue, and also pointed out the way to the methods which have proved successful and are proving more and more successful as they are used more and more in the early stage of the disease. The cause of the failure of the former methods was found to be due to the extension of carcinoma cells into the parametrium in practically all cases when the patient comes for operation. It follows then logically and has been thoroughly established by extensive experience, that any operation that is to be used with a reasonable hope of success in carcinoma of cervix, must remove the infiltrated parametrium. Any operation in which the line of excision lies close to the uterus, as in the old vaginal and abdominal hysterectomy for cancer, cannot be successful except in certain rare cases where the disease is just beginning.

Jacobs, in 82 vaginal hysterectomies, saw recurrence in every one. Some series by the old vaginal or abdominal hysterectomy, show a few recoveries, past the five-year limit—but they are very few and far between. McMonigle reported 481 hysterectomies for cancer of the uterus, with 479 deaths from recurrence or from the operation. Russell investigated the after condition of 48 cases of vaginal hysterectomy for cancer of the cervix, and found that almost invariably there was recurrence at the site of the scar, and not in the region of the lymphatic glands.

Another important point in regard to the operation is that if TRANSPLANTATION METASTASES are to be certainly avoided, the infiltration-area must not be cut into at any step of the operation—that is, it is not advisable to take out the uterus and then the infiltrated tissues around the uterus, but the whole infiltrated area, including uterus and parametrium, should be removed as one mass, the line of excision being everywhere placed in healthy tissue. When an incision is made through infiltrated tissue, cancer cells are liable to be carried into healthy tissue, where they may grow. This has happened in several reported cases. Where an incision must be made through infiltrated tissue, it is safer to make it with the cautery, as that destroys all cells with which it comes in contact.

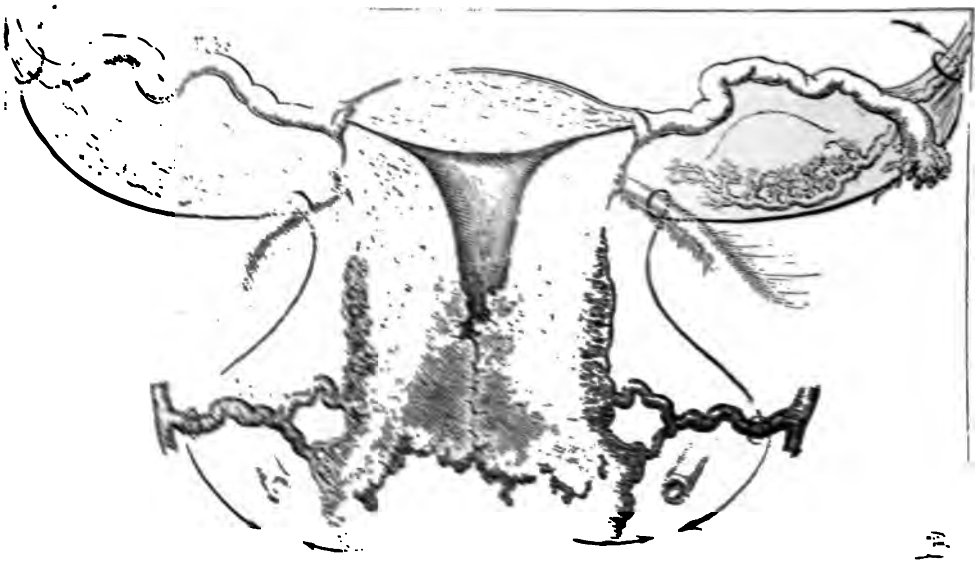
It must be kept in mind also that it is impossible to be certain in any case that the parametrium is not involved, no matter how early the case or how perfectly normal the parametrium feels. Sampson has demonstrated conclusively that in some cases the carcinoma sends out, by direct growth, very fine prolongations into the parametrium and, in other cases, the carcinoma cells make short excursions into the lymph spaces of the parametrium. In such cases, there is no change in the parametrium appreciable to the examining finger.

It is evident then that any operation, whether vaginal or abdominal, that does not remove the parametrium, is not admissible as an operation for the cure of carcinoma of the cervix, except in certain rare cases. Any operation, whether vaginal or abdominal, that does **remove the parametrium,** is admissible in that it fulfills one of the essential requirements. Whether the work is done by way of the vagina or by way of the abdomen, is a matter of secondary importance. The essentials of the operation are shown in Fig. 698. One point to be kept in mind is the removal of the uterus and parametrium intact. The broad ligament, including the tubes and ovaries, should of course be removed. It is in the lower part of the broad ligament, however, that the infiltration extends the farthest and that the principal operative difficulties are met with.

There are various methods which more or less thoroughly accomplish the removal of the uterus together with all the adjacent and particularly the parametrean tissue. They are performed either by the vaginal or the abdominal route. The standard operation through the vagina is that now generally known as the Schauta-Schuckardt operation, the latter having suggested a unilateral or bilateral deep incision into the paravaginal tissue which lays the vagina wide open and gives easy access to the lateral portions of the parametrium. The abdominal operation, though originally conceived and variously modified and improved by other operators, is commonly designated the Wertheim operation.

The author prefers the abdominal route as a rule in operating for cancer of the cervix, but there can be no serious objection to the vaginal operation when it includes the technic required for the removal of the parametrium. There is not space here to take up the details of the operation, which are fully considered in the author's "Operative Gynecology."

As mentioned later, it is advisable in the operable cases to precede the operation by a heavy dose of radium and follow it by deep x-ray therapy.



[illegible]

Inoperable and Borderline Cases

[illegible] X [illegible] dose [illegible] danger of [illegible]

Choice between Radium, X-Ray and Operation

[illegible] treatment of [illegible] at [illegible] and [illegible] pleteness of the knowledge concerning radium and x-ray therapy. The information concerning them is coming in so rapidly that a considerable part of it is still undigested, as far as sustaining clinical practice is concerned. Some opinions are evidently based on enthusiastic hopes rather than on tested evidence. The second factor is that many of the radical pronouncements as to treatment are by workers familiar with only one or two of the measures under consideration.

In uterine myoma and in uterine cancer the three measures mentioned, rightly used according to present knowledge, are not antagonistic or exclusive one of the other. Rather they are supplementary. Each has its field in which it is clearly the best treatment. The edges of the fields merge, of course, giving classes of cases in which the choice is not strongly one way or the other.

Radium

In the advanced inoperable cases and in the borderline cases, radium is our most effective remedy. The palliative effect is nothing short of wonderful. The enlarged carcinomatous cervix with its bleeding papillary masses melts away as by magic, and the cavity closes, largely or entirely by healthy granulation. However, this beneficient effect is limited in extent and diminishes rapidly with the distance from the radium. The cancer cells are killed in the area in which all tissue is devitalized and also in the next zone in which the effect is sufficient to kill the cancer cells but not the tissue cells. It is from this latter zone that the cancer-free granulations come which lead to healing of the cavity. Beyond this is a third zone in which the cancer cells

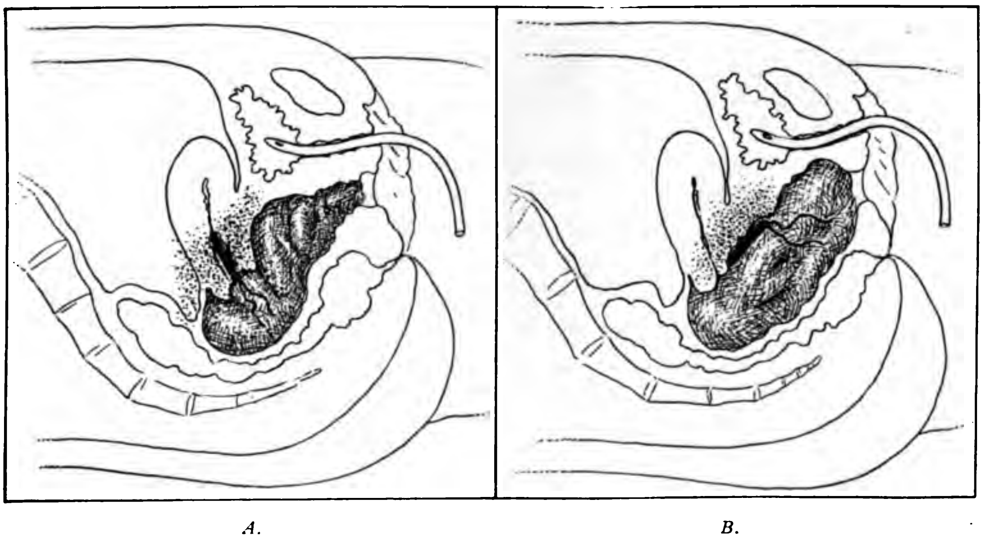


Fig. 699.—Radium treatment of carcinoma of cervix uteri, showing the method of packing away the rectum and the bladder. In order to obtain proper distance-screening of the rectum and the bladder in heavy dosage of radium, the packing must be very large and firm necessitating a retention catheter in the bladder.

A, The radium placed in the canal for involvement in that situation. *B*, The radium placed on the surface for extensive surface involvement of cervix and vaginal wall.

are partially devitalized, and eventually are killed through connective tissue growth and pressure starvation. Beyond this is a fourth zone in which the cancer cells are not harmed—in fact, may be stimulated to more rapid growth. An intracervical application of radium is shown diagrammatically in Fig. 699 A and a vaginal application in Fig. 699-B.

The problem of radium treatment in carcinoma of the cervix uteri is the problem of widening the second zone so that it extends to the pelvic wall. This is a difficult problem and is still unsolved, though progress is being made. By the use of large doses of radium the second zone may be pushed far out toward the pelvic wall, but the first zone, the zone of complete devitalization, is also widened, with resulting serious sloughing affecting the bladder, ureters, and rectum. By heavy screening, the first zone may be limited and the second zone greatly widened, theoretically even to the pelvic wall. But there then appears another harmful effect quite as serious if not more so than sloughing and fistula formation, and that other effect is extensive connective tissue contraction, or fibrosis, which develops gradually in certain cases after radium treatment. This leads to gradual constriction of nerves, with persistent pain, and gradual stenosis of the rectum, ending in occlusion. Several cases have been reported in which colostomy was required.

So radium is two-edged—it cuts both ways and may do much harm as well as much good. Consequently its use requires decided caution. It is hoped that in time the curative effects of radium may be extended to the limits of the pelvis, but that ideal has not yet been attained. In some extensive cases the cancer is completely eradicated by the radium; however, this result is attained in only a small proportion of the cases. It may be hoped for but it is so infrequent in the classes of cases under consideration that the remedy must be presented to the patient as essentially a palliative measure, with only a possibility of cure. As mentioned later, it is advisable to employ also deep x-ray therapy, to affect the cancer cells lying beyond the effective reach of the radium. But even this combination must still be classed generally as palliative rather than curative.

X-Ray

[illegible] x-ray treatment is to devital-[illegible] growths and the outer por-[illegible] effective reach of the radium [illegible] cancer of the uterus [illegible] question of metastasis is [illegible] earliest operable cases [illegible] the plan of treatment [illegible] cancer cells. [illegible] of the uterus. Recent [illegible] regarding [illegible] curative effects may [illegible] x-ray treatment of [illegible]

The Knife

In early operable cases, that is, in those early cases apparently still confined to the uterus, I feel that immediate removal of the uterus and adjacent tissue likely to be involved is the safest plan. Theoretically we should be able to cure these patients with radium with as great certainty and with far less danger than with the knife. But so far the actual results in cancer of the uterus do not justify displacement of the knife by radium in these early cases.

In something over one thousand reported cases of carcinoma of the cervix treated by radium five years previous to the reports, about 20 per cent were cured—approximately the same percentage as by radical operation. This large series of reported cases was collected by Dr. F. J. Taussig in an excellent review (Am. Jour. Obst. and Gynec., December, 1920). When the cases were divided into classes it was found that more of the advanced and borderline cases were cured by radium than by operation, while of the early operable cases the percentage of cures by radium (31 per cent) fell decidedly below that by operation (40 to 45 per cent). It is hoped that advance in the technic of radium treatment will eventually place it far ahead of operation in percentage of cures even in these early cases, but that result has not yet been attained.

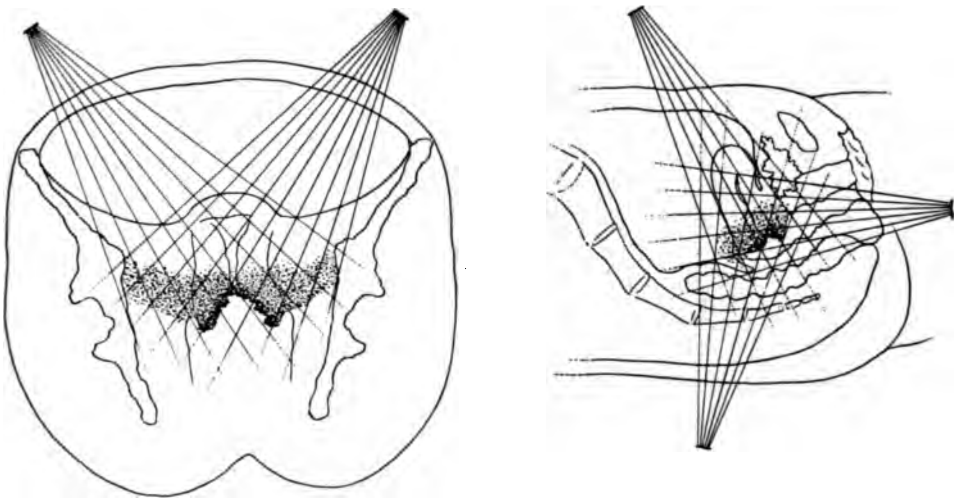

A. *B.*

Fig. 706.—X-ray treatment of carcinoma of cervix uteri. In order to place sufficient dosage in the cancer area without injury to the overlying skin, extensive cross firing is necessary, and the use of many ports of entry one after another. *A*, indicates successive steps in firing through lateral portions of the abdomen. *B*, indicates other ports of entry—the central abdomen, the sacral region and the pelvic outlet. Improvements in technic have now made practical x-ray treatment through a vaginal speculum.

There is still uncertainty as to how far radium will be effective in a particular case. It gives wonderful results in some cases but in others it stops short of expected effectiveness. And the most disconcerting thing about it is that we do not know why it fails where apparently it ought to succeed and succeeds where apparently it should fail. Outside the technical details of its application, its effect is evidently modified by the type of cancer cell present, by the type of tissue cell in the area, by the condition of the cells in the particular case, and by the resistance or defensive power, both local and general, of that individual. These important items vary with each patient and we know so little about them, even in the normal or typical individual, that it is not strange that there should be certain unexplained results or lack of results in clinical radium work. It is this uncertainty that makes operation the safer plan in the clearly operable cases. We know what can be done with the knife in the individual case. We do not know the extent of effectiveness of radium in an individual case until it is tried in that case. And in the time required for trial by radium the chance of cure by operation slips away.

In order to give the patient the best chance of cure in these early cases it is advisable to employ both radium and operation. First, give a heavy dose of radium, the same as though depending on it to effect the cure. Then within a week or ten days do the radical operation. The operation should be carried out within a short time after the radium treatment because later the connective tissue changes from radium become so marked as to increase very decidedly the difficulties and hazard of the operation.

This plan of treatment for the early case is based on the assumption that the patient is a good operative risk. If the patient has some serious complication making her a poor operative risk, then her best chance of survival cancer free may be through radium without operation. The decision for or against operation, and of the extent of operation, turns on a balancing of the hazards pro and con: the hazard of operation, the chance of failure of radium to kill the cancer cells in that individual, and the chance of metastasis near and far. On account of the latter danger, it is advisable to supplement the other treatment by deep X-ray therapy.

Another point, and one which seems at times to be overlooked, is that these powerful remedies require experienced judgment and skill in their application. They are as potent as the knife and in inexperienced hands may produce as disastrous results [illegible] of injury to important organs [illegible] results that would have been obtained by a really [illegible]

Other Palliative Measures

[illegible] stimulants and tonics as indicated. [illegible] cases sedatives will be [illegible] freely as required to re[illegible] bowel movements will [illegible]

[illegible] vaginal [illegible] and in that way [illegible]

[illegible] diminishing the bleeding [illegible] years ago, and recapitulated in a recent article (Jour. Mo. State Med. Assn., February, 1922). This method has the distinct advantage that, in suitable cases, the foul odor and the bleeding may be kept away without the repeated anesthesia necessary where dependence is placed on curettage and cauterization at intervals. It is applied as follows: With a sharp curet all the broken down tissue is cleared out, leaving a cavity with firm walls. This thorough curettage is best made under general anesthesia. The cavity is sponged clear of blood and debris, and then quickly packed with gauze wrung out of very hot water. This tends to check the oozing and is to be held firmly in place while the patient's hips are elevated to the Trendelenburg posture in preparation for the acetone application. Then the vulva and vaginal walls are coated with vaseline, the hot packing is removed and a tubular speculum large enough to surround the greater part of the raw cavity is introduced and pressed firmly against the cervix. The pure acetone is then poured into the speculum (through a funnel or simply from the bottle) in sufficient quantity to fill the end of the speculum for an inch or so (Fig. 701). Keep the acetone thus in contact with the raw surface for thirty minutes. Then the acetone is removed by soaking it up with cotton in forceps or by lowering the table and allowing it to run out of the speculum. After the cavity is dried with cotton, a tampon is introduced through the speculum and held in place as the speculum is withdrawn. This tampon may be left in place for several hours, to absorb any acetone left and thus prevent irritation of the vaginal wall. The coating of the vulvar and vaginal surfaces with vaseline is to prevent irritation by stray drops of the acetone.

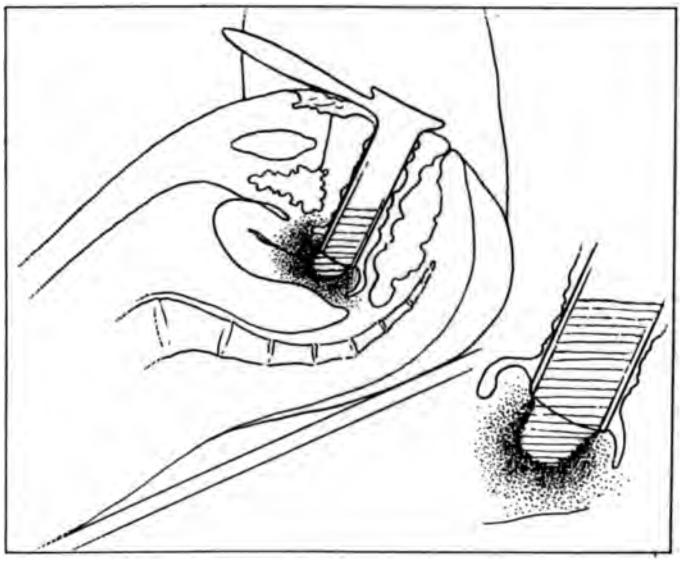


Fig. 701.—Acetone treatment of carcinoma of cervix uteri. The cylindrical speculum is pressed firmly against the involved area so as to confine the liquid acetone and prevent it from burning the vaginal wall. The insert at the right lower corner shows better the details of the crater, speculum-end and acetone.

The acetone application, without curettage, is to be repeated twice weekly until the cavity is well contracted, and after that occasionally as needed to prevent bleeding and odor. The application may last 30 to 45 minutes—the longer the better as a rule. The speculum is to be held in place all this time. Usually the patient can steady the speculum in place after having been shown how to do so.

Toxins.—Much work has been done with the idea of developing a toxin or antitoxin or serum that would check the growth of malignant tumors, but so far nothing satisfactory has been created. Coley's toxin (made from a culture of the streptococcus and the bacillus prodigiosus) has produced occasional beneficial effects, principally in sarcoma. But the results in carcinoma have not been such as make its use worth while. Doyen's cancer serum proved a failure. It is to be hoped that the present wave of investigation into the causes of malignant disease will produce something of real value.

Carcinoma Complicating Pregnancy

Pregnancy may take place in a woman with beginning carcinoma of the cervix or carcinoma may develop after impregnation. In either case the effect of the pregnancy is to markedly hasten the growth of the cancer. Carcinoma complicating pregnancy is rare, being found only three times in a collective series of 54,833 labor cases. The treatment depends on whether or not the carcinoma is operable.

Carcinoma OPERABLE. When there is a fair chance of cure by radical operation, that should be carried out at once, "irrespective of the viability of the fetus."

Carcinoma INOPERABLE. When the carcinoma of the cervix is inoperable, the life of the child is the thing of principal moment, and the treatment should be palliative and directed toward preserving the life of the mother until the child has advanced far enough to have a good chance of independent existence. The details of the treatment and the time to interfere in an operative way must be determined by a careful study of the conditions present and the probable developments in each case.

CARCINOMA OF THE CORPUS UTERI

Adenocarcinoma [illegible] It begins in the endo-[illegible] the curet at a very [illegible] the tissues immediately [illegible] tissue being slow—[illegible] Cancers of the corpus [illegible] than cancer of the [illegible] treatment. The [illegible] shown diagrammat-[illegible] in an early stage, is [illegible] Figs. [illegible] and 712. The [illegible] shown in Figs. 706 [illegible]

Chorioepithelioma is a peculiar form of carcinoma arising from the fetal cells covering the chorionic villi (Figs. 713 to 717). A striking feature is the early penetration of blood vessels, with resulting metastases to distant organs, which makes it an exceedingly fatal growth, even when removed comparatively early. Care should be taken to exclude it whenever there is persistent bleeding coming on some weeks or months after confinement or miscarriage. It is especially liable to occur following hydatidiform mole. Such was the history of the specimen shown in Fig. 647. This patient was first seen some months after the expulsion of a large hydatidiform mole. The immediate cause of the consultation was repeated uterine hemorrhage, difficult to control. Curettage gave tissue that showed malignant disease of the corpus uteri. A hysterectomy was done, and sectioning of the removed uterus showed a typical chorioepithelioma.

Malignant Adenoma is simply an adenocarcinoma in which the glandular structure is preserved more typically.

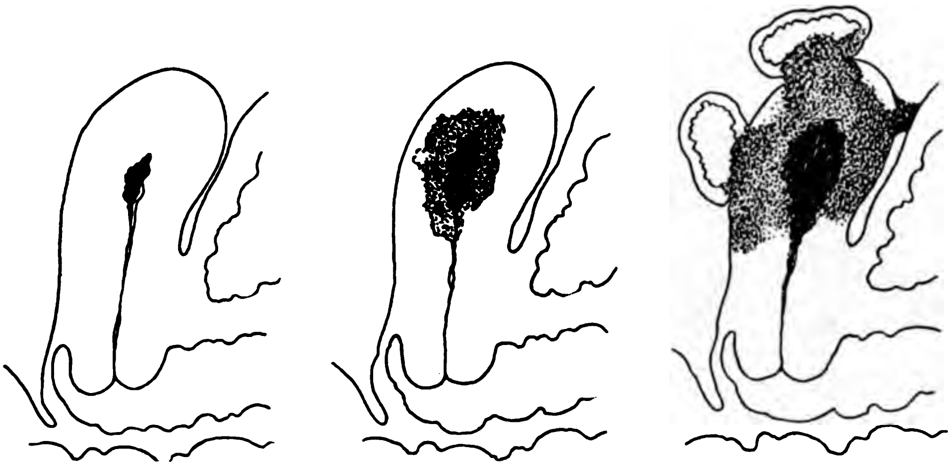


Fig. 702.—Progressive development of carcinoma of the corpus uteri. *A*, Carcinoma of the corpus begins in the endometrium. *B*, Extensive involvement of the uterine wall. *C*, Extension through the uterine wall and involvement of adjacent structures.

Endothelioma is a rare form of malignant disease of the corpus in which, like that in the cervix, the spaces are lined with cells resembling endothelium.

Symptoms, Diagnosis, Treatment

The symptoms and diagnosis are much the same as for carcinoma of the cervix, and have just been presented under that subject. In the early stage a positive diagnosis can be made only by curettage and microscopic examination of the curettings (Figs. 169, 171, 507). Chronic endometritis, particularly that associated with senile changes, is the affection with which it is most likely to be confounded. A very practical question is, "In what cases is it advisable to do curettage in order to exclude malignant disease of corpus uteri?" In all cases in which the bloody uterine discharge persists in spite of treatment for endometritis. When a patient, near the menopause, comes

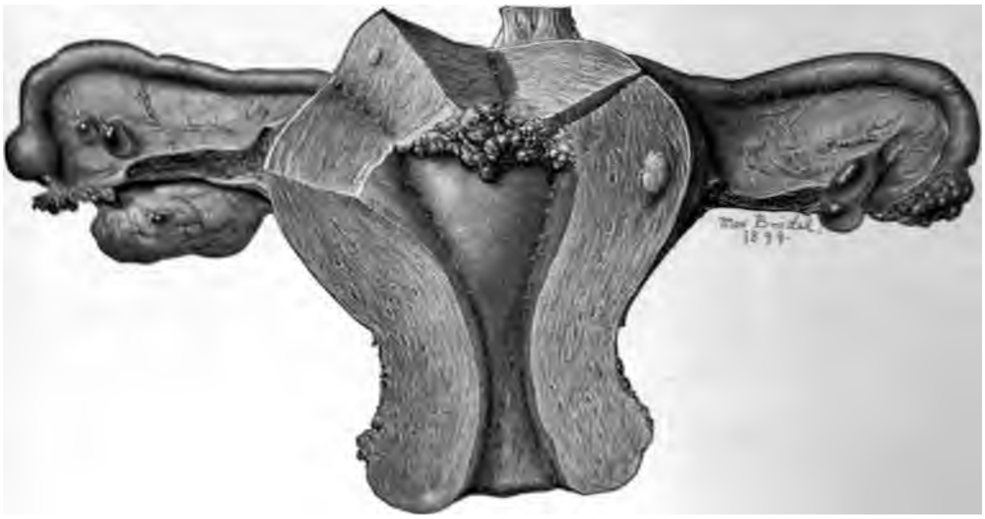
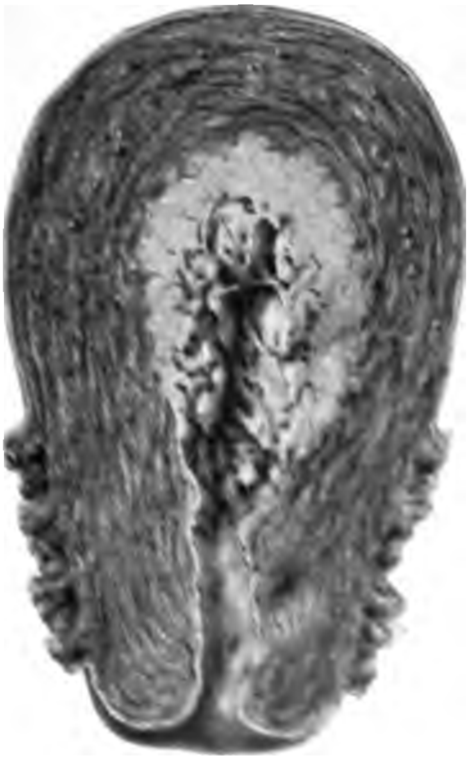
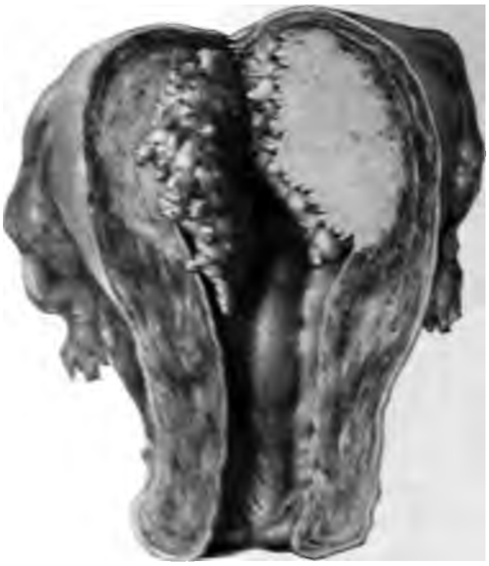


Fig. [illegible]. Beginning carcinoma of the corpus uteri. There is no external sign of the growth at this stage, except an occasional streak of blood in the leucorrheal discharge. The diagnosis must be made by curettage. (Cullen, *Cancer of the Uterus.*)





[illegible] The growth has [illegible] extensively, but the cervix is not yet involved.

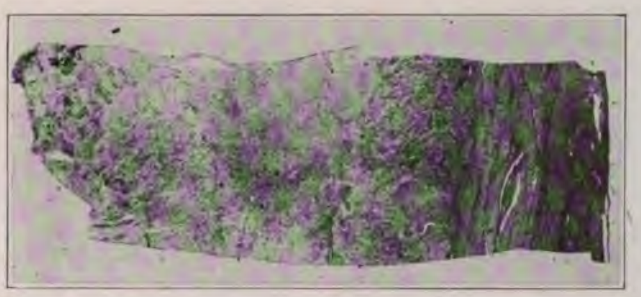


Fig. 706.—Adenocarcinoma of the corpus uteri. This is a section of the entire thickness of the wall of the uterus. The endometrium (left end) had been largely removed by a diagnostic curettage a few days before the hysterectomy. The diagnostic curetting is shown in Fig. 170. Gyn. Lab.

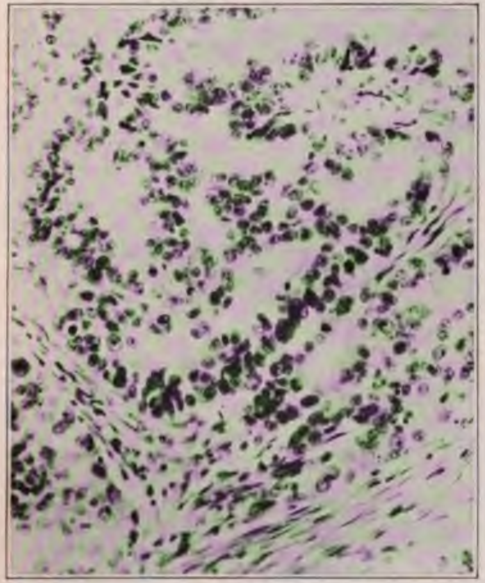


Fig. 707.—Same growth as in Fig. 706, higher power. This is in a portion of the growth where the adenomatous arrangement of the cancer cells is well marked. Gyn. Lab.

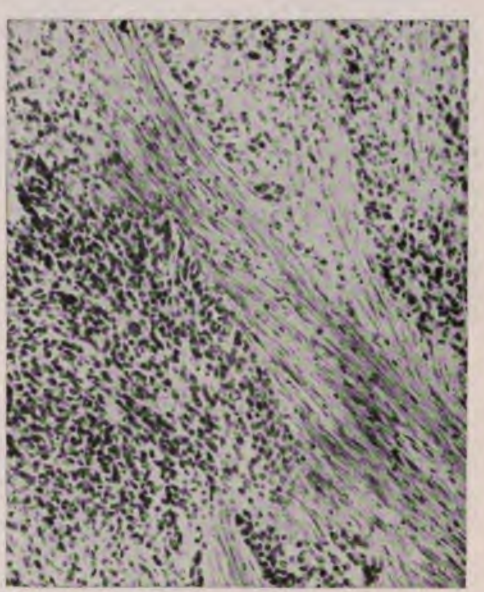


Fig. 708.—Same growth as in Fig. 706. This is at the spreading edge of the growth and shows the carcinoma cells penetrating the muscle tissue. Gyn. Lab.

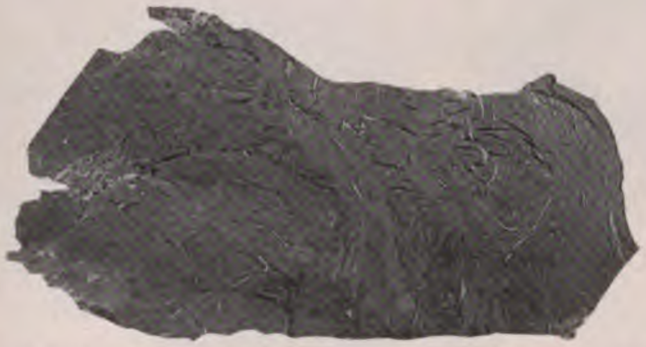


Fig. 709.—Another case of carcinoma of the corpus uteri. Notice near the center the clear-cut line of the advancing carcinoma. The uninvolved portion of the wall lies to the right. Gyn. Lab.

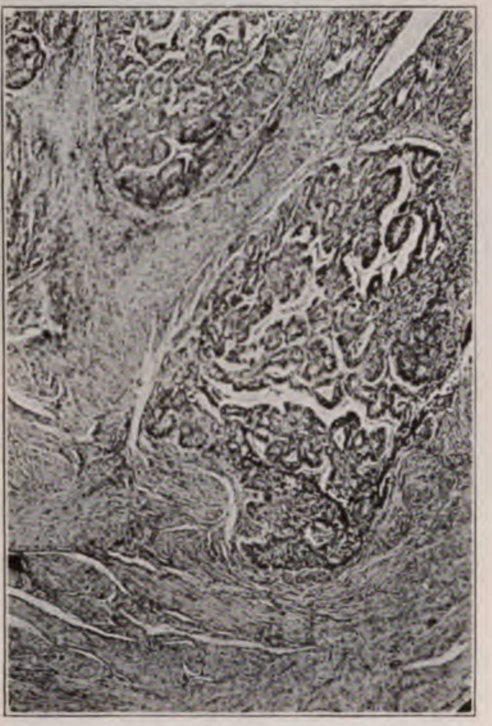


Fig. 710.—High power of specimen shown in Fig. 709. Gyn. Lab.

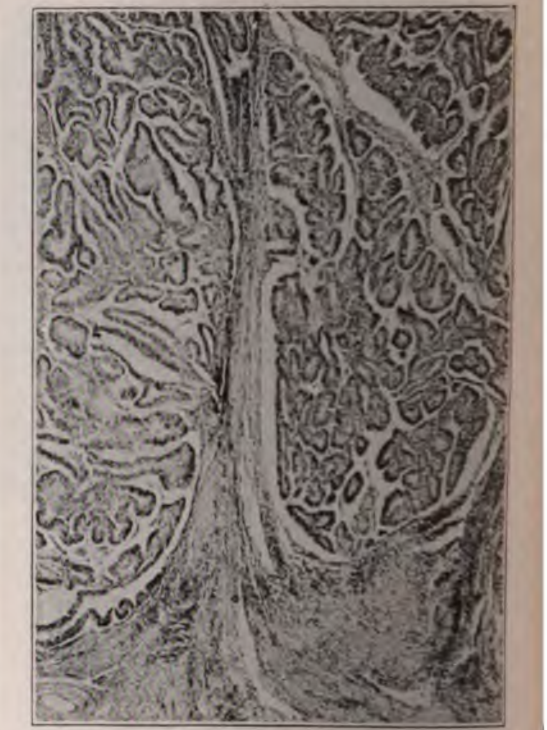


Fig. 711.—Still higher power of specimen shown in Fig. 709. Gyn. Lab.

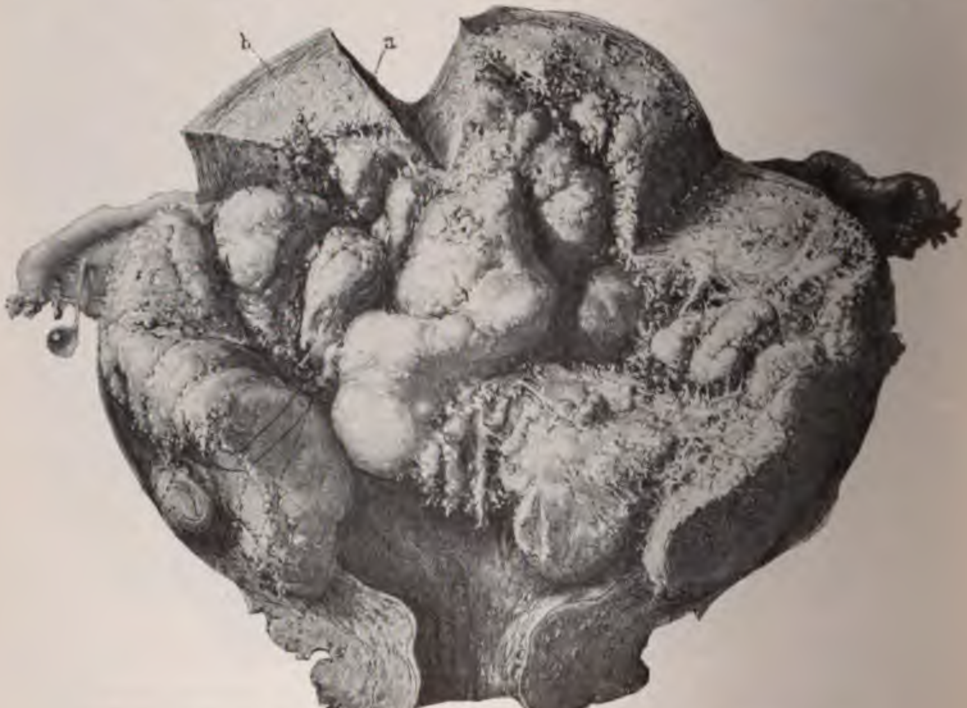


Fig. 712.—Advanced carcinoma of the corpus uteri. (Cullen—*Cancer of the Uterus.*)

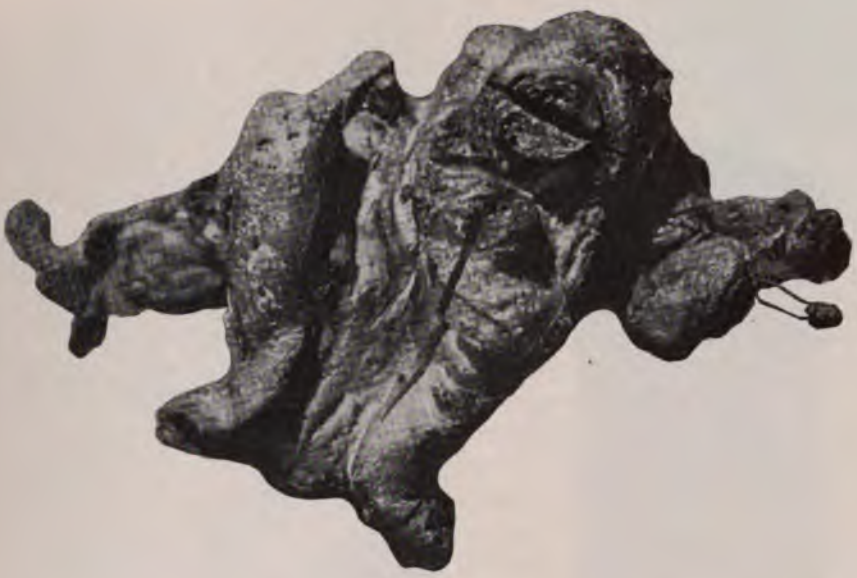


Fig. 713.

Fig. 713. Chorioepithelioma of the uterus. The uterus, which is about one-half larger than normal, has been opened from the posterior surface and spread out. Projecting from the endometrial surface on the right side near the fundus is a nodule which has been incised. It is the size of a walnut and extends into the wall almost to the peritoneum. Sections from this nodule show the characteristic structure of chorioepithelioma. The fact that in chorioepithelioma there is early erosion of the blood vessels and early metastasis to distant organs should in no wise discourage operation in this class of tumors, but should simply stimulate us to greater endeavor to make the diagnosis at the earliest possible moment. This patient was heard from more than five years after the operation, and was still well and with no evidence of recurrence. Gyn. Lab.

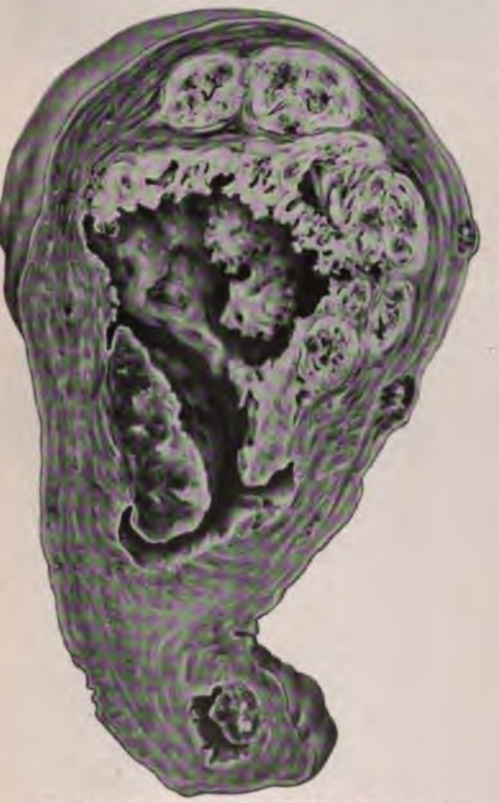


Fig. 714.—Another case of chorioepithelioma of the uterus, showing extensive involvement of the corpus uteri and a metastatic growth in the cervix. Gyn. Lab.

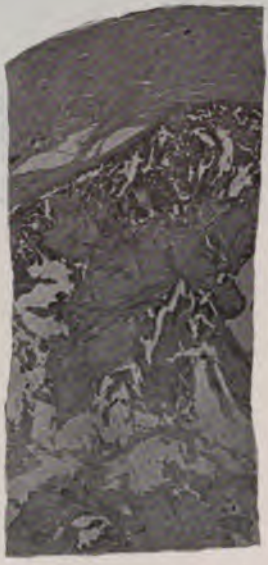


Fig. 715.—Low power from the specimen shown in Fig. 714. Above is the uterine wall and below it the tumor formation. Gyn. Lab.

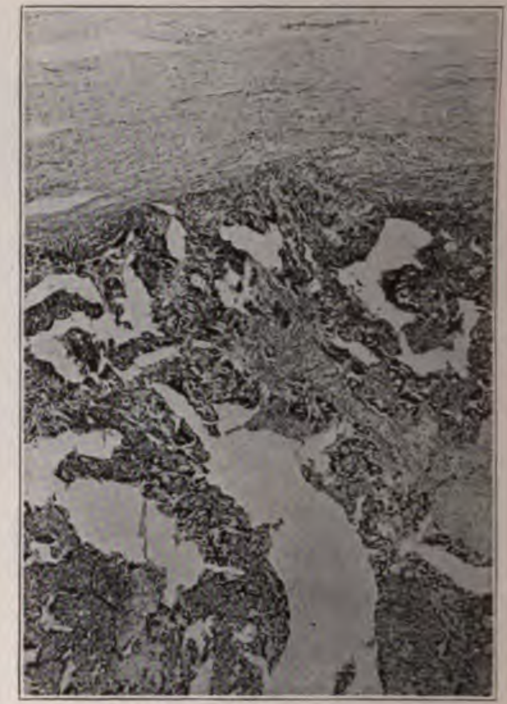
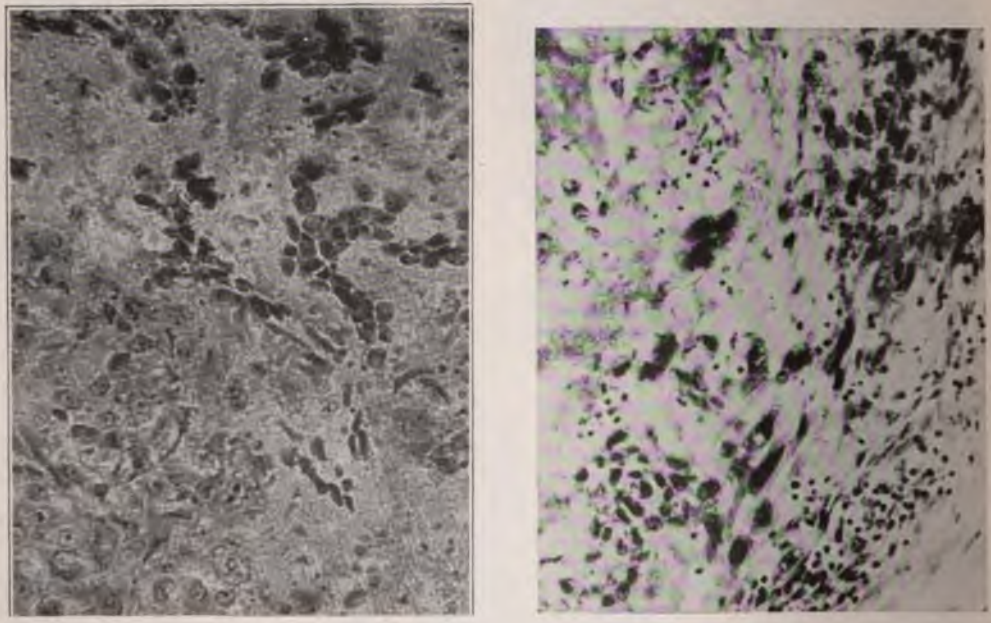


Fig. 716.—Higher power from the upper right portion of Fig. 715. Gyn. Lab.



A. *B.*

Fig. 717.—High power, from the specimen in Fig. 715. *A*, shows syncytial cells and Langhans' cells. The latter are shown particularly well, as large light-staining cells in contrast to the darker syncytial cells. *B*, A different field, showing other syncytial cells. Gyn. Lab.

complaining of irregular menstruation or irregular bloody discharge, and examination shows no trouble with the cervix, no uterine myoma and no periuterine disease, it is best to assume that the bleeding is due either to chronic endometritis or to beginning malignant disease of the endometrium. If the probabilities are in favor of endometritis, put the patient on ergot and watch for two or three weeks. If the bloody discharge ceases, that points to endometritis and the treatment is continued. If the bloody discharge persists or if it returns after cessation, then insist on curettage. Malignant disease ordinarily cannot be excluded except by a thorough curettage under anesthesia, which means systematic removal of endometrial tissue from all parts of the uterine cavity. Another important point is that all the curettings must be preserved and subjected to the microscopic examination. For points in regard to collecting and transmitting curettings see Chapter I.

The **treatment** for carcinoma of the corpus uteri is complete hysterectomy at once. When the disease is discovered early, ordinary hysterectomy, either abdominal or vaginal, will practically always suffice to remove all involved tissue. In the advanced cases removal of more or less of the parametrium and other periuterine tissues is required. In cases not suitable for operation, radium and x-ray are to be used.

SARCOMA OF THE UTERUS

A sarcoma is a malignant growth arising from connective tissue or connective tissue derivatives. The cause of sarcoma, like that of carcinoma, is

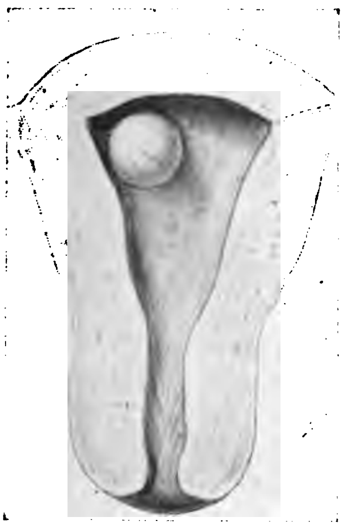


Fig. 718.—Beginning sarcoma of the corpus uteri. At this stage there is no external evidence, except blood streaks in the discharge. The diagnosis must be made by curettage. (Kelly—*Operative Gynecology*.)

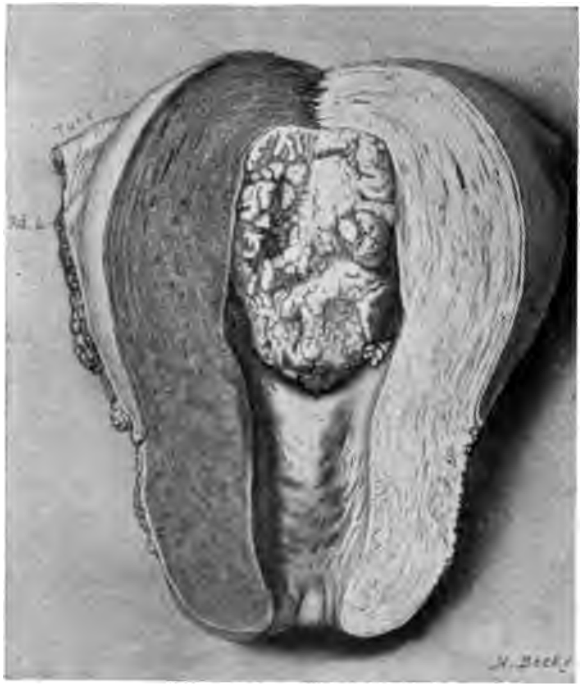


Fig. 719.—More advanced sarcoma of the corpus uteri. (Cullen—*Cancer of the Uterus*.)

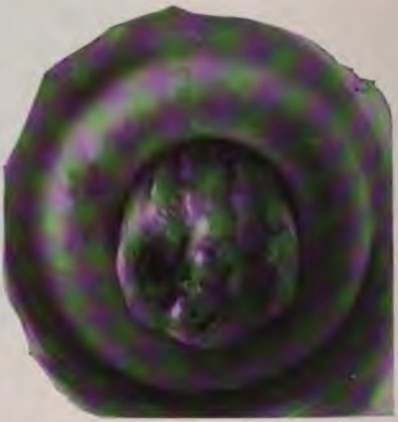


Fig. 720.—Polyp protruding from the cervix, which on removal and submission to routine microscopic examination proved to be sarcomatous. The uterus was then removed and when opened revealed the condition shown in Fig. 721. Gyn. Lab.

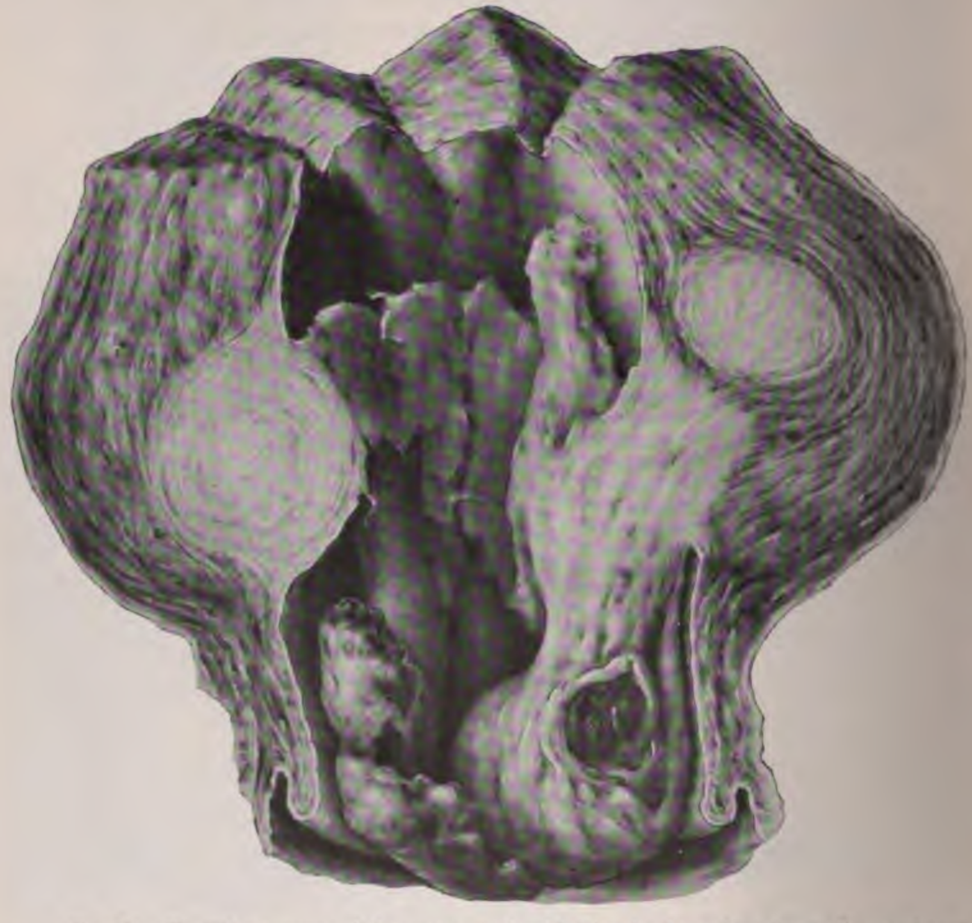


Fig. 721.—Extensive sarcoma of the corpus uteri originating in the endometrium. The exuberant growth formed polypoid masses which from time to time projected from the cervix (see Fig. 720) and were removed as simple cervical polypi. This happened several times before the patient came under the author's care. Gyn. Lab.

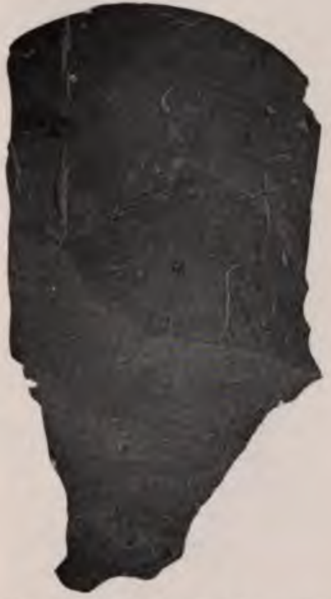


Fig. 722.—Sarcoma of the endometrium. Section from the specimen shown in Fig. 721. The sarcomatous area is above. Notice the distinct line of demarcation between it and the normal portion of the uterine wall underneath. Gyn. Lab.

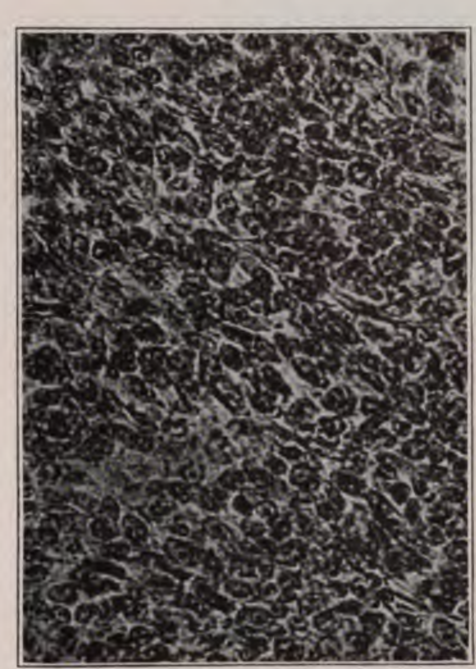
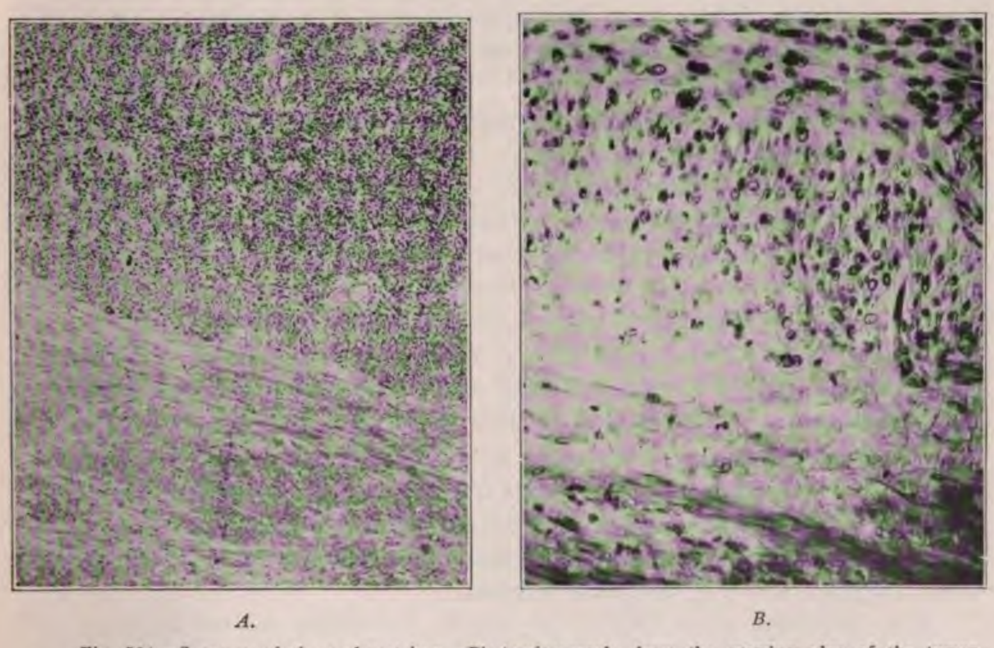


Fig. 723.—Sarcoma of the endometrium. High power, from the section shown in Fig. 722. This is the round-celled type of sarcoma. The appearance in the spindle-celled type of sarcoma is shown in Fig. 171.



A. *B.*

Fig. 724.—Sarcoma of the endometrium. Photomicrographs from the growing edge of the tumor shown in Figs. 721 and 722. *A*, Low power, showing the line of junction of the sarcoma (above) with the normal wall. *B*, High power of the contact area. Gyn. Lab.

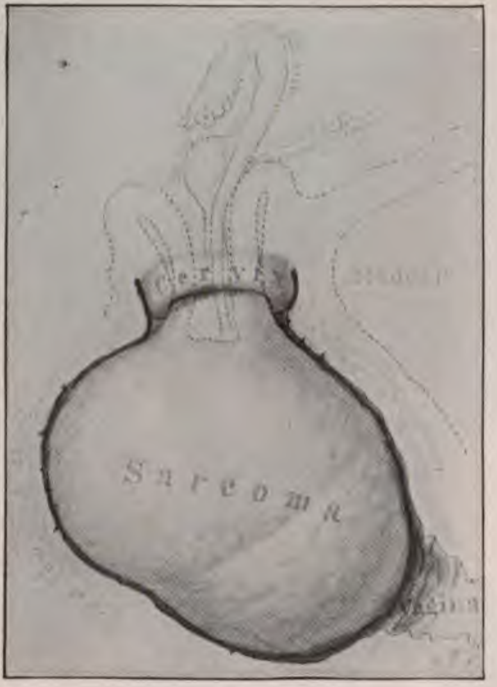


Fig. 725.—A sarcoma of the uterus projecting into the vagina and causing partial inversion of the uterus. (Kelly—*Operative Gynecology.*)

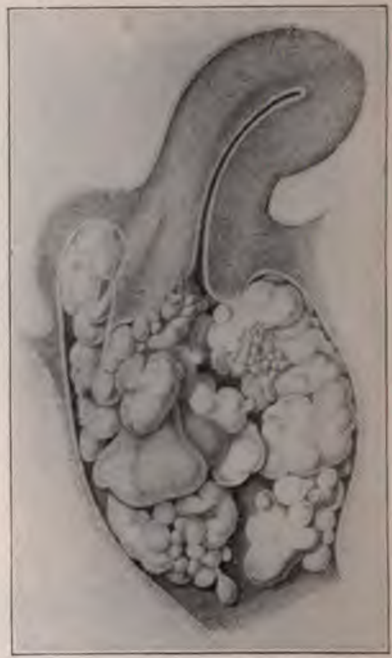


Fig. 726.—Grape-like sarcoma springing from the cervix uteri and forming a mass in the vagina. (Kuestner—*Kurzes Lehrbuch der Gynaekologie.*)

not known. About the same theories have been brought forward to account for it. Sarcoma differs from carcinoma in that it may occur at any age (though more frequent from the age of forty to sixty), and furthermore it is not especially associated with child-bearing.

Sarcoma of the uterus occurs usually as a mixed cell sarcoma containing large spindle cells and giant cells. Rather characteristic of uterine sarcoma is the great diversity in size and shape of the cells. Large round-cell sarcoma is occasionally encountered, and very rarely a tumor of the small round-cell type. While in true sarcoma the tumor cells originate from the connective tissue elements, there occurs the so-called sarcoma myocellulore or malignant leiomyoma in which the tumor cells consist of more or less mature muscle cells. This type is rare. Most interesting is a form of tumor which cannot be differentiated microscopically from non-malignant myoma, but which forms metastasis rather early. It is very rare.

Sarcoma of the uterus may occur *de novo,* but usually is found in myomatous uteri. The differential diagnosis from myoma is not always easy since nonmalignant myomata frequently contain giant cells and mitotic figures. Especially in degenerating myomata the nuclei become enlarged and somewhat irregular and may resemble sarcoma.

The sarcomata grow rapidly or slowly, depending on the character of the particular tumor. They infiltrate adjacent tissues like the carcinomata and cause death in about the same time. They metastasize to the pelvis and abdomen and, more rarely, to distant organs. The symptoms, diagnosis, and treatment of sarcoma of the uterus are practically the same as for carcinoma. Beginning sarcoma of the corpus uteri is shown in Fig. 718, and more advanced in Figs. 719 and 721. Occasionally a sarcoma of the endometrium forms polypi which project from the cervix and may be mistaken for simple mucous polypi of the cervix (Fig. 720). The microscopic features of sarcoma of the corpus uteri are shown in Figs. 722 to 724. A pediculated sarcoma causing partial inversion of the uterus is shown in Fig. 725, and a grape-like sarcoma springing from the cervix, a rare type, is shown in Fig. 726.

CHAPTER X

PELVIC INFLAMMATION

Pelvic inflammation is the term applied to inflammation in the pelvis outside the uterus. The inflammatory process may be located in the fallopian tubes, in which case it is called "salpingitis," or it may be in the ovary, in which case it is called "oophoritis," or in the peritoneum, where it is known as "pelvic peritonitis," or it may be in the connective tissue, where it constitutes "pelvic cellulitis." The cause of these various forms of inflammation is the same—viz., infection—the symptoms are much the same, the treatment is in many respects the same, and two or three of the lesions are usually associated—in some cases so intimately associated that it is difficult to determine which is the most important. Consequently, from a practical standpoint, it is best to consider all these lesions together under the one comprehensive term "pelvic inflammation."

Before taking up the disease proper, attention must be called to some points in the anatomy of the structures involved.

POINTS IN ANATOMY

Of Fallopian Tubes, Pelvic Peritoneum, Pelvic Connective Tissue.

FALLOPIAN TUBES

The fallopian tubes, or oviducts, are two small muscular tubes, one on either side, which extend from the fundus uteri outward in the upper part of the broad ligament toward the pelvic wall (Figs. 4, 5). Each tube has a small central cavity extending its whole length (Fig. 418). The inner end of this cavity communicates with the uterine cavity and the outer end opens into the peritoneal cavity. Thus there is a direct opening from the outside of the body into the great peritoneal sac, through the vagina, uterus and fallopian tubes (Fig. 727). This is why infection of the genital tract in a woman leads to peritonitis so much more frequently than infection of the genital tract in a man—the infection in the vagina simply extending along this mucous tract directly into the peritoneal cavity.

The tubes vary considerably in size and somewhat in shape in different individuals. The length of each tube is three to five inches and the direction is outward, backward, downward and inward—somewhat resembling a shepherd's crook and partly surrounding the ovary (Fig. 4).

That portion of the tube lying in the uterine wall is known as the **interstitial portion** or uterine portion. It has a very narrow lumen (Fig. 727). That portion of the tube extending from the margin of the uterus to the beginning of the curve is called **isthmus.** It is about the diameter of a slate pencil and is firm. The lumen is small, but becomes gradually larger toward the outer end. The outer curved dilated portion of the tube is known as the **ampulla.** It is about the size of a lead pencil and the lumen also is much larger than that of the isthmus (Figs. 727, 728). The outer end of the tube is known as the **fimbriated extremity** or the infundibulum. This consists of a funnel-shaped expansion surrounded by a fringe of slender, finger-like processes called "fimbriae." One of these extends to the ovary and is attached there and is called the "ovarian fimbria."

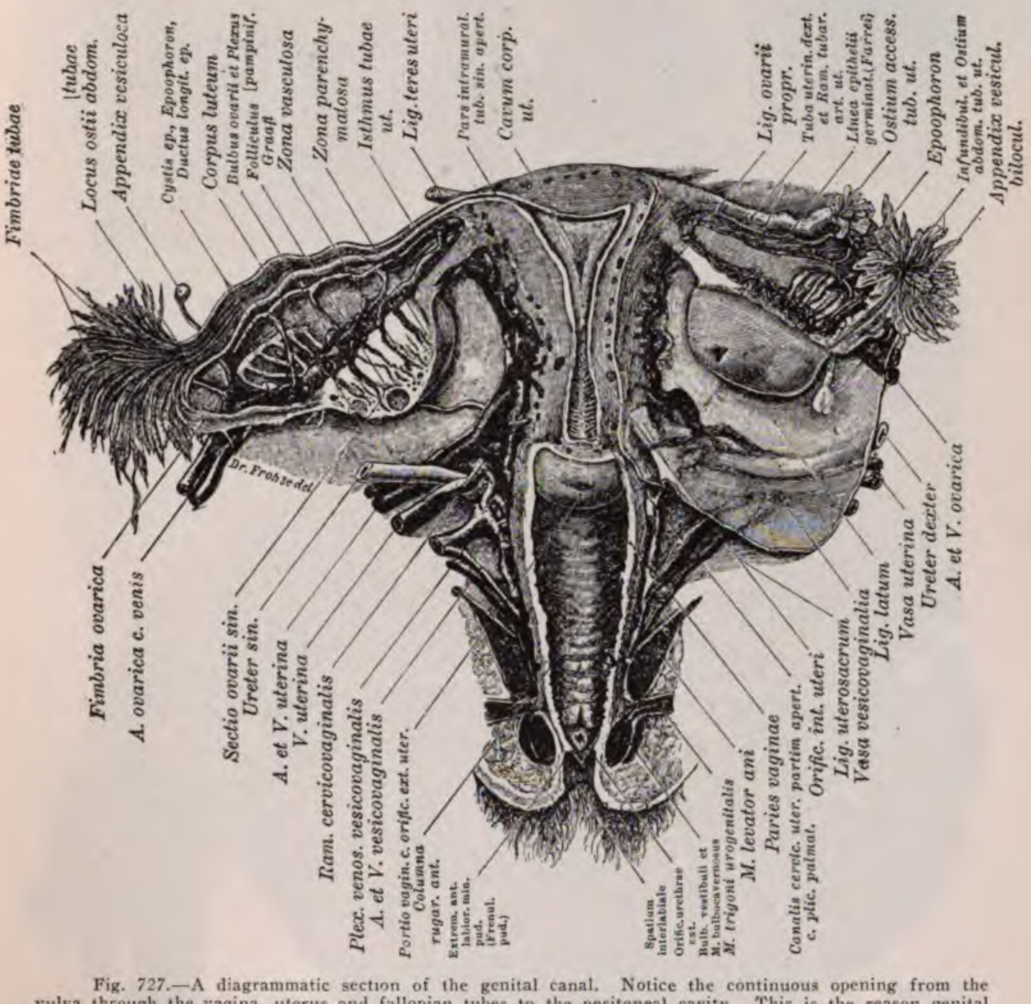


Fig. 727.—A diagrammatic section of the genital canal. Notice the continuous opening from the vulva through the vagina, uterus and fallopian tubes to the peritoneal cavity. This is the reason genital infection extends to the peritoneal cavity so much more frequently in women than in men. (Waldeyer—*Das Becken.*)

In structure the wall of the tube is largely muscular, resembling the uterus. In fact it is derived from the same fetal organ as the uterus (Fig. 902). The tube lies beneath the peritoneum of the upper margin of the broad ligament and its wall presents three layers—peritoneal, muscular and mucous.

The **peritoneal layer** does not differ materially from peritoneum elsewhere. It is composed of flat endothelial cells lying on a basis of firm connective tissue. Immediately beneath the peritoneum is a layer of connective tissue sometimes called the subperitoneal layer. In this run blood vessels and lymphatics. The interstitial portion of the tube has, of course, no peritoneal layer, as the muscular tissue of the tube is in immediate contact with the muscular tissue of the wall of the uterus.

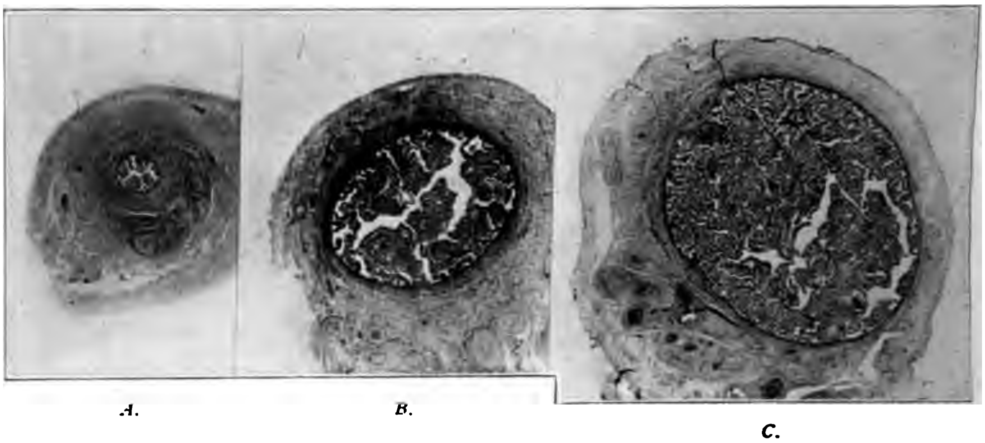


Fig. 728.—The lumen of the tube at different portions. Notice the progressive increase in size of the lumen from the uterine end outward. *A*, the uterine end; *B*, the middle; *C*, near the outer end. Gyn. Lab.

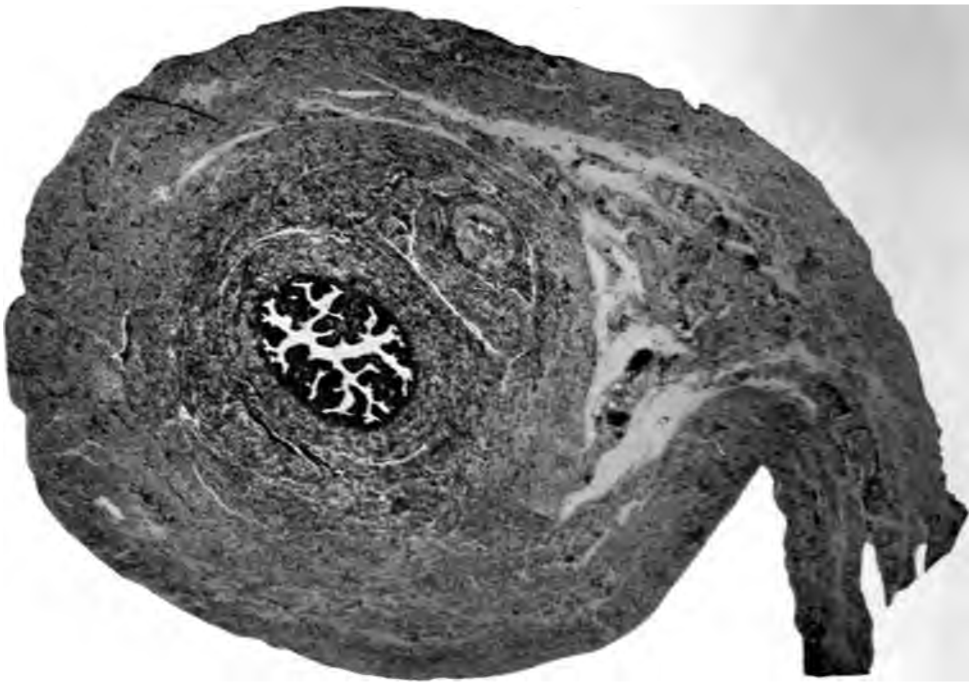


Fig. 729.—Section of normal tube near the uterine end. The mucosa is placed directly on the muscular layer, and is much folded longitudinally. Gyn. Lab.

The **muscular layer** of the tube is composed of involuntary muscular tissue, disposed in two strata, an outer longitudinal and an inner circular. Both these strata are continuous, with similar muscular strata in the uterus. The internal stratum sends prolongations of muscular tissue into the four principal folds of the mucosa. The muscular layer is thinner at the abdominal end than at the uterine portion of the tube. The increased thickness of the wall at the abdominal end of the tube is due to the many folds of mucosa.

The **mucous layer** of the tube, like the uterine mucosa, is placed directly upon the muscular layer—there is no intervening submucosa (Figs. 728, 729). The surface of the mucous membrane is formed of a layer of ciliated cylindrical cells. The cells are somewhat taller than those lining the body of the uterus and not so tall as those lining the cervix uteri. Beneath the epithelial layer the mucosa is composed of "stroma cells," very much like those found in the uterus, except slightly smaller. Between the stroma cells is a delicate

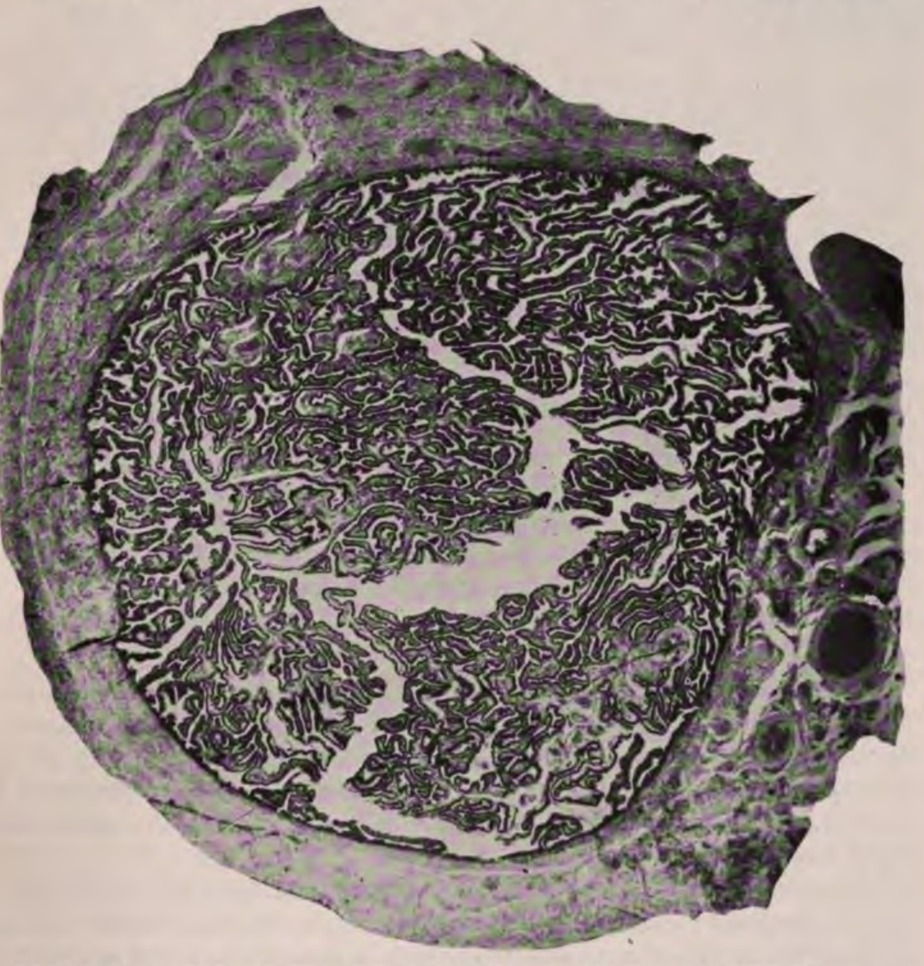


Fig. 730.—Section of the tube near the outer end. The extensive longitudinal folding of the mucosa produces the spaces that give the gland-like appearance in the section. In this mass of delicate folds inflammation would quickly cause disorganization. The intricacy of the folds in the normal tube is well shown in this photomicrograph. Gyn. Lab.

connective tissue framework. There are found also capillary blood vessels and small lymph channels.

There are no glands in the tubal mucous membrane. The depressions which look like glands are due simply to the folds of the mucous membrane (Figs. 729, 730). As there are no glands in the tube, there can be no mucous secretion, such as takes place in the uterus. The fluid by which the tube is distended in certain pathologic conditions is inflammatory exudate and not glandular secretion.

The mucous membrane is much folded longitudinally (Fig. 418). There are four principal folds into which prolongations of the muscular tissue take place. There is no muscular tissue in the many smaller folds. In the interstitial portion and in the isthmus the folds are few and simply longitudinal (Fig. 729), but in the outer portion of the tube (the ampulla) they become very complex and fill the tube with folds extending in every direction (Fig. 730)—so much so that it is sometimes difficult to decide which is the main canal of the tube. The cilia of the epithelium project into the lumen of the tube and by their movement toward the uterus aid the passage of the ovum in that direction. In the presence of this delicate and much-folded mucous membrane, inflammation in the tube quickly causes serious changes. The cilia are lost, the folds become adherent (Fig. 746), pockets of serum or pus form, and the picture of the tubal interior may be so changed as to be hardly recognizable.

Vessels and Nerves.—The blood supply of the tube comes from the ovarian artery through several small branches. The uterine artery helps to supply the tube in some cases. The veins open into the pampiniform or ovarian plexus and pass into the broad ligament. The lymphatics join with those from the ovary. The nerve supply comes from the pelvic plexus of each side.

Physiology.—The primary function of the fallopian tube of each side is to convey ova from the corresponding ovary to the uterus. It is supposed to require several days for the ovum to pass the length of the tube. In addition to this, the tube conveys spermatozoa in the opposite direction, and it is usually in the tube that the union of the ovum and the spermatozoon takes place.

The mechanism by which the ovum is carried from the ovary into the tube is complicated. After the graafian follicle in the ovary bursts, the liquor folliculi causes the ovum to adhere slightly to the surface of the ovary. Some of the fimbriae are in contact with the surface of the ovary and, when an ovum comes into contact with one of them, the cilia carry it towards the entrance of the tube. Besides this action of the cilia directly on the ovum, the constant movement of all the cilia causes a slight current of peritoneal fluid toward the interior of the tube from all directions. This helps to carry the ovum or any other particles into the tube. The fact that there is such a current towards the interior of the tube has been demonstrated in animals by the injection into the pelvic peritoneal cavity of numerous small insoluble particles, which were found later in the tubes.

It has been suggested that the fimbriated extremity of the tube grasps the ovary when an ovum is discharged, but this has not been proved.

Normal Changes in the Tube

In studying the anatomy of the uterus it was found that this organ, particularly the mucosa, was subject to normal changes under three conditions: namely, menstruation, pregnancy and the menopause. Now, in the fallopian tube also, we find normal changes, due to menstruation, to pregnancy, and to the menopause. Speaking generally, it may be said that these changes are like those occurring in the uterus, but less marked.

During **menstruation** there is congestion of the tube and possibly a slight effusion of blood into the interior of the tube. If this does take place, however, it is slight and is of no importance when considering the source of the menstrual blood. Practically all of the menstrual blood comes from the uterus. In a case of removal of the uterus by operation and the fastening of one of the tubes in the vaginal incision, a slight bloody flow was noticed at the menstrual periods for a few months. But such tubes are pathologic, and it is an open question whether or not a bloody flow would take place from a normal tube.

In **pregnancy** (normal pregnancy, not tubal pregnancy) the tube wall and mucous membrane become thickened and the folds enlarged. The vessels also become larger, especially the veins and lymphatics. After confinement the tube undergoes involution along with the uterus.

After the **menopause** the tube shows certain senile changes. There are disappearance of the cilia, diminution in the size of the tube, shrinking of the connective tissue, and shrinking of the mucosal folds. The tube becomes smaller and firmer, and is no longer a functionating structure.

PELVIC PERITONEUM

The pelvic peritoneum is that portion of the wall of the peritoneal sac which lies in the pelvis. It is attached more or less closely to the pelvic organs and its free surface comes in contact with the peritoneal surface of the intestines as they move about in the lower abdomen. To get an idea of the distribution of the peritoneum in the pelvis, imagine a piece of thin cloth laid over the pelvic organs and tucked down firmly around them (Fig. 450).

Starting from the abdominal wall, the peritoneum passes on to the bladder, and from the posterior surface of the bladder to the uterus (Fig. 3). The height of the abdominovesical fold of peritoneum varies much with the varying size of the bladder, which fact is of much importance in surgical work. The distance to which the peritoneum extends down the anterior surface of the uterus varies considerably in different persons. Usually it extends to the level of the internal os and is about an inch above the anterior vaginal fornix. When the bladder is distended, the peritoneum is drawn upward somewhat. This vesicouterine fold of peritoneum forms the two so-called "vesicouterine ligaments."

The peritoneum then folds over the uterus and tubes and round ligaments, covering these structures and forming the "broad ligament" of each side. All the posterior surface of the uterus is covered with peritoneum, except that portion lying within the vagina. The fold of peritoneum extends a considerable distance below the point of attachment of the vagina to the uterus (Fig. 3) before being reflected on to the rectum. The deep pouch of peritoneum thus formed is called the "culdesac of Douglas" (Fig. 4). It is known also as the "posterior culdesac" and as the "posterior peritoneal pouch" and as the "rectouterine pouch." This posterior culdesac is very important surgically. A collection of exudate or a tumor in this situation can be easily felt from the posterior vaginal fornix. This is the point of incision in posterior vaginal section, and it is usually the first place that the peritoneal cavity is entered in vaginal hysterectomy.

The peritoneum, as it is reflected from the uterus to the rectum, helps to form the "sacrouterine ligaments." The sacrouterine ligaments, two in number, one on each side, extend backward from the lower part of the uterus around the rectum to the sacrum. They are composed of connective tissue, a few muscular fibers and peritoneum. The culdesac of Douglas dips down between them for a considerable distance (Fig. 4). The expanse of peritoneum extending from the sacroiliac ligament to the broad ligament of each side forms a kind of shelf. The two together are sometimes called the "rectouterine shelves." There is also a fold or shallow pouch of peritoneum on each side between the fallopian tube and the round ligament. A small portion of the uterus at the sides and in front is not covered with peritoneum (Fig. 451).

The structure of the pelvic peritoneum is much the same as of peritoneum elsewhere. It is a very thin and smooth membrane, formed of a basis of delicate fibrous and elastic tissue, supporting large endothelial cells.

PELVIC CONNECTIVE TISSUE

Between the peritoneum and the rectovesical fascia there is connective tissue. This is distributed so as to fill all the spaces (Figs. 451, 731). When it is necessary for organs to change their relation to each other in physiologic activity, the connection is open and loose so as to permit free movement and much stretching. The principal collections of connective tissue are at the sides of and in front of the cervix uteri and at the base of each broad ligament. The areas of connective tissue are exceedingly rich in lymphatics and veins. Inflammation taking place in the connective tissue is called "pelvic cellulitis."

The connective tissue about the uterus is often spoken of collectively as the "parametrium" or parametrial tissue, and inflammation of the same is accordingly called "parametritis." This is a very convenient term, but is likely to be confounded with the similarly sounding word "perimetritis." The latter means inflammation of the structures about the uterus, particularly, however, of the peritoneum of the uterus and adnexa. In writing, these two terms may be safely used, but in conversation they are very liable to be confounded, as they sound so much alike.

It was formerly supposed that nearly all inflammation in the pelvis outside the uterus was inflammation of the connective tissue (i.e., pelvic cellulitis), but it has been found that in the majority of cases the inflammation invades first the tube and later the peritoneum, and that usually the involvement of the connective tissue, if present at all, is a late development and of only secondary importance. There are exceptions to this rule—for example, those inflammatory conditions resulting from tears of the cervix or from operation on the cervix. Also in puerperal infections, particularly streptococcic, the inflammation very frequently extends directly through the wall of the uterus in the pelvic connective tissue.

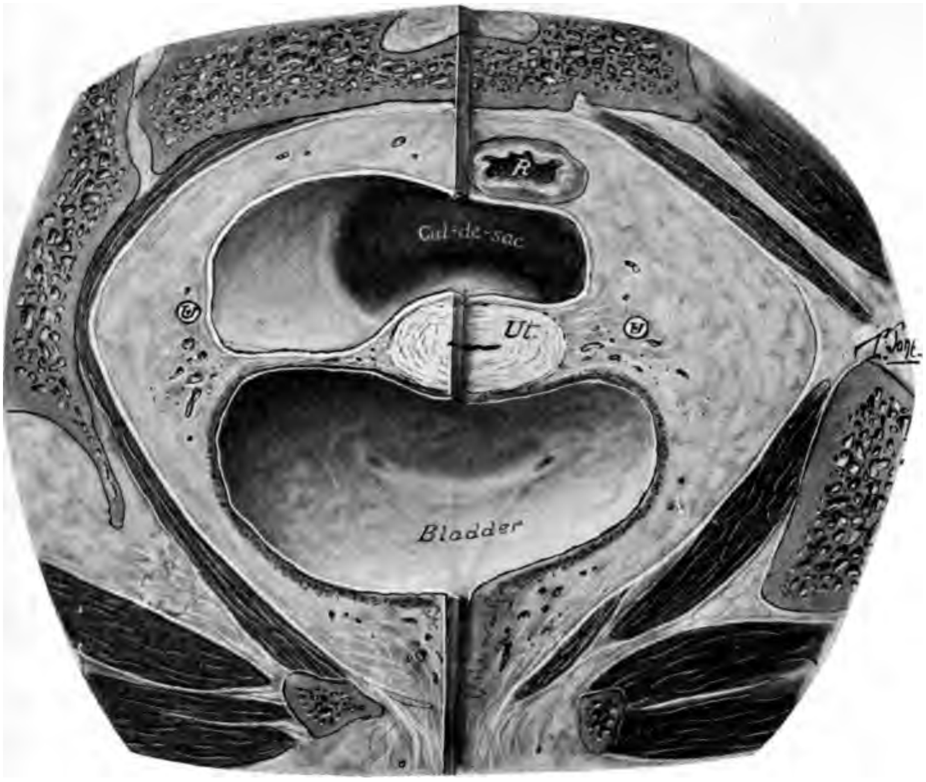


Fig. 731.—Diagrammatic representation of the connective tissue areas in the pelvis. Left side of pelvis—section through cervix, showing the large area of connective tissue at side of cervix. Right side of pelvis—section at higher level, showing how the broad ligament becomes thinned, leaving only a small amount of connective tissue at side of corpus uteri.

ACUTE PELVIC INFLAMMATION

Coming now to the consideration of the disease itself, we find that pelvic inflammation may be acute or chronic. Let us consider first the acute variety.

The inflammatory process may be in the fallopian tubes (salpingitis) or in the ovaries (oophoritis), or in the peritoneum (pelvic peritonitis), or in the connective tissue (pelvic cellulitis).

Etiology

The cause of acute pelvic inflammation is infection. The infection may be with the ordinary pus germs (staphylococcus and streptococcus) or with the gonococcus. Practically every case of primary acute pelvic inflammation in the adult can be traced to infection from **labor,** from **abortion,** from **instrumentation** or from **gonorrhea.** Secondary inflammation of the genital organs may be caused by extension from an inflammatory focus in some adjacent organ—e.g., the appendix or the bladder.

In a large proportion of the cases of pelvic inflammation, particularly the gonorrheal cases, the infection extends by way of the uterine mucosa to the fallopian tubes, and through the tubes to the peritoneum and other pelvic structures. In puerperal metritis (streptococcic or staphylococcic) the infection more often extends by way of the lymphatics directly through the wall of the uterus, from the endometrium to the connective tissue around the uterus, and to the peritoneum. Another avenue of entrance is through the thrombosed sinuses of the puerperal uterus. Infection of these sinuses leads to infective thrombosis of the broad ligament veins, resulting in broad ligament abscess or general pyemia or both.

The fact that nearly every case of pelvic inflammation is due to an infected endometritis emphasizes the importance of checking endometritis at once when present, and of preventing it whenever possible.

Pathology

The pathologic changes are varied. There are hardly two cases exactly alike and the same case presents a very different picture at different periods. However the cases may be divided somewhat into classes, as follows:

1. **Mild Salpingitis.**—The inflammation is very slight. There is some round-celled infiltration of the wall of the tube, with slight thickening and hardening, and a few fimbriae bound together. Both ends of the tube are open. This is the mildest form of pelvic inflammation, and as a rule gives rise to very few symptoms. A more severe type of the same class is that in which both ends of the tube are occluded and the fimbriae are matted together, and the tube distorted and often adherent to the ovary or to some other structure. The wall of the tube is thickened, but the cavity contains no appreciable amount of fluid.

2. **Salpingitis with Exudate.**—In the cases of this class there is a large amount of exudate, binding together the tubes, ovaries, intestines and uterus, but there is no distinct collection of pus.

3. **Pyosalpinx (Tubal Abscess).**—The tube is distended with pus and there are the usual evidences of inflammation within and without the tube, but no pus outside the tube. There may or may not be a large mass of exudate. In exceptional cases the infection may localize in the ovary instead

of in the tube, causing an **ovarian abscess.** In still other cases the abscess cavity involves both the tube and the ovary, forming the **tubo-ovarian abscess.**

4. **Diffuse Suppuration in Pelvis.**—In this fourth class the pus itself has extended outside the tube, the fibrinous exudate always extending before it and shutting it off from the general peritoneal cavity. This may result simply in an abscess low in the pelvis, which can be easily reached and evacuated from below, or the inflammation may extend until all the pelvic organs are bound together in an irregular mass (Fig. 735), with pus lying in the spaces between them and burrowing into the connective tissue. In such a case there are present all the lesions of pelvic inflammation—salpingitis, oophoritis, peritonitis and cellulitis.

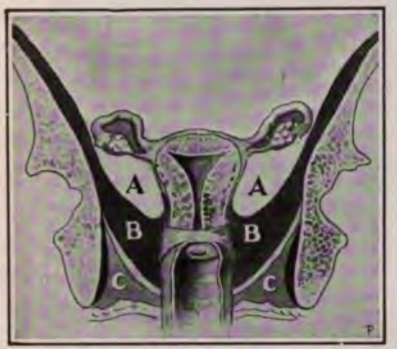


Fig. 732.—The three spaces or areas in the pelvis. *A.* Peritoneal cavity. *B.* Subperitoneal connective tissue area or parametrial space. *C.* Ischiorectal space. The white line between *B* and *C* represents the levator ani muscle. (Dudley—*Practice of Gynecology.*)

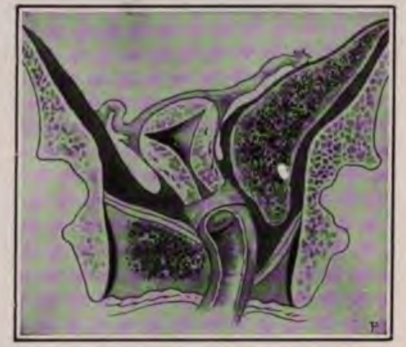


Fig. 733.—On the right is a large inflammatory mass in the parametrial space. This is what is meant ordinarily by the term pelvic cellulitis.

On the left is a small inflammatory mass in the ischiorectal space. From inflammatory trouble in this region comes the well known ischiorectal abscess. (Dudley—*Practice of Gynecology.*)

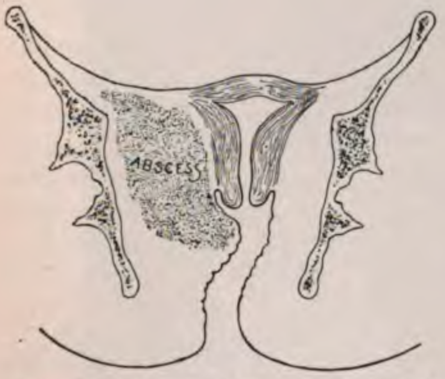


Fig. 734.—Mass beside uterus, formed by abscess in broad ligament. (Montgomery—*Practical Gynecology.*)

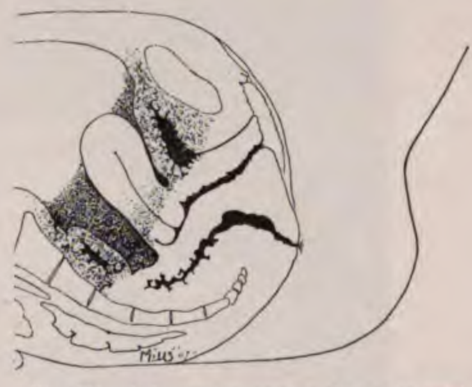


Fig. 735.—Inflammatory exudate filling the pelvis and forming a firm roof above the examining fingers. The resisting "roof" of an extensive inflammatory mass usually follows about the line here indicated.

5. **Acute Diffuse Peritonitis.**—In cases of this class the infection is so virulent and spreads so rapidly that but little limiting exudate is formed. The infection quickly involves the general peritoneal cavity and causes a

fatal peritonitis. This is an unusual form of pelvic inflammation and found principally in cases of severe sepsis following labor or abortion.

6. **Cellulitis** (Figs. 732, 733, 734) is largely a lymphangitis of t connective tissue about the uterus. It is due usually to the streptococcus, th

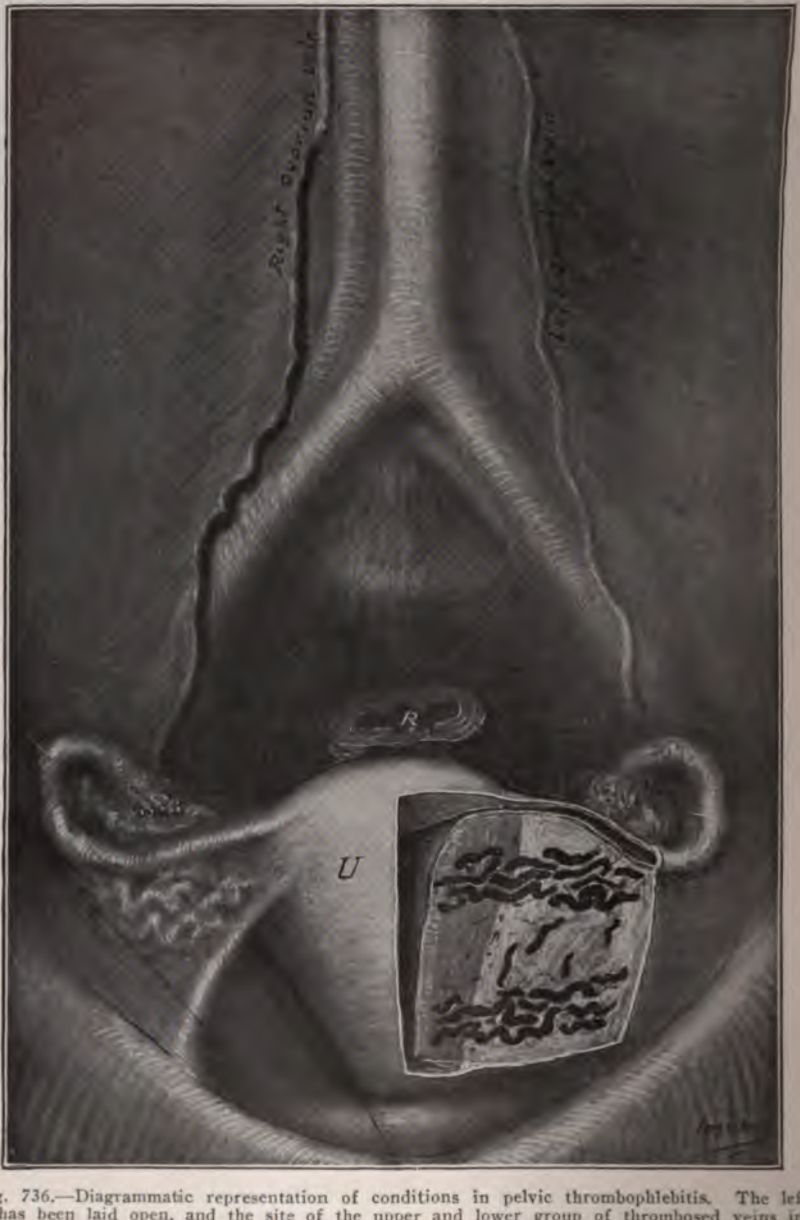


Fig. 736.—Diagrammatic representation of conditions in pelvic thrombophlebitis. The left broad ligament has been laid open, and the site of the upper and lower group of thrombosed veins indicated. The right ovarian vein is shown thrombosed almost to its termination in the vena cava.

staphylococcus or the colon bacillus—rarely, if ever, to the gonococcus Cellulitis is favored by deep laceration of the cervix, which opens connective area beside the uterus. Pelvic cellulitis, like inflammati nective tissue elsewhere, may end in resolution or abscess formation or general sepsis. If resolution takes place or if an abscess forms and is opened, the inflammation subsides, leaving only infiltration and scar-tissue, which causes but few symptoms aside from distortion of the parts. The inflammation may, however, extend to the peritoneum, in which cases there are added the evidences of pelvic peritonitis.

7. **Septic Thrombosis** (Fig. 736) comes from infection of the normal thrombi filling the uterine sinuses after labor. It constitutes a severe and often fatal form of puerperal sepsis. In the effort to limit the infective and destructive process in the sinus or vein, Nature causes another thrombus to form proximal to the infected one. If the infection extends into the new thrombus, a portion of the vein proximal to that in turn becomes thrombosed. This process may keep on until the veins of the broad ligament become extensively thrombosed. If the infection enters through the upper part of the uterus (the usual placental site), it affects the ovarian veins in the upper part of the broad ligament (Fig. 736, left side). If it enters through the lower portions of the uterus, the resulting septic thrombosis affects the uterine veins lower in the broad ligament (Fig. 736).

If Nature succeeds in limiting the process to this region, pockets of pus may form in the thrombosed veins and break into the connective tissue, forming a pelvic abscess, which can be recognized and opened. If Nature does not succeed in limiting the process, it extends centrally—along the ovarian veins (Fig. 736) toward the vena cava, or along the lower veins to the internal iliac, the common iliac and finally to the vena cava. When the common iliac is involved, the process extends downward also along the external iliac vein, producing the usual signs of external iliac thrombosis (so-called "milk leg"). It must be kept in mind, however, that external iliac thrombosis may or may not be septic thrombosis, many cases occurring without any evidence of sepsis. At any stage of the septic process in the veins, infected particles may become detached and pass into the general circulation, giving rise to metastatic foci in various parts of the body, and constituting general pyemia.

Symptoms

A patient with acute pelvic inflammation complains of **pain** in the lower abdomen, increased by movements, such as walking or turning over or sitting up. She is usually confined to bed. There may be moderate **fever** (101° to 103°) or there may be high fever (105°), the high temperature being found most frequently in pelvic inflammation following labor or miscarriage.

There is usually a **vaginal discharge,** due to the coincident inflammation of the endometrium, and there is a **history** of a recent labor or abortion, or instrumentation or gonorrhea, or a history of a chronic endometritis due to one of these causes.

On abdominal examination the lower abdomen is found to be tender on pressure. This **tenderness** may be confined to one or both tubal regions or it **may extend** over all the lower abdomen. On account of this tenderness the **abdominal** muscles are held more or less tense, thus preventing deep palpation.

In the vaginal examination the character of the discharge is determined, indicating to some extent the etiology of the trouble, and there is noticed also the presence or absence of evidences of recent labor or miscarriage. Manipulations in the upper part of the vagina cause pain. This **tenderness** on vaginal palpation and bimanual palpation is found both in the body of the uterus and about the tube of one or both sides. If a **mass of exudate** is present, it may be felt to one side of the uterus or behind it. If the exudate is low in the pelvis—for example, in the posterior culdesac or about a prolapsed ovary or tube—it may be easily felt back of the uterus just above the posterior vaginal fornix. If the exudate is situated high in the pelvis, it may require very deep bimanual palpation to detect it, and the deep bimanual palpation may be impossible at first on account of the tension of the abdominal muscles. The mass of exudate is distinguished by its being more resistant (firmer) than the surrounding tissues and more tender on pressure. The exudate may extend all around the uterus, fixing that organ as though plaster of Paris had been poured into the pelvis and had hardened there. In these cases of extensive distribution of the exudate, the sensation imparted to the examining fingers is that of a firm roof across the pelvis just above the vagina (Fig. 735). The uterus projects through this roof of exudate and is held firmly by it.

If there is a **collection of pus** of considerable size, fluctuation may be detected, the soft area being surrounded by a firm area of exudate which has not yet broken down. If there is only a small collection of pus, not large enough to give fluctuation, its presence is indicated by persistent fever and its location is shown by a point of marked tenderness. When there is an inflammatory exudate in the posterior culdesac, fluctuation may in some cases be detected earlier by rectal than by vaginal examination, the rectal finger being able to palpate the posterior surface of the mass.

In **septic thrombosis** without other involvement and in puerperal pyemia there may be no evidence of pelvic peritonitis or of pelvic cellulitis—simply repeated chills and high fever without any palpable local lesion of sufficient extent to account for them. There is tenderness in the region of the veins affected, and in some cases distinct induration may be made out, particularly where there is more or less perivenous inflammation. If the infection has come through the upper part of the uterus (which is the usual location of the placental site and hence of the area of penetration), the ovarian veins are the ones most likely to be affected. In many cases they alone have been found involved (Fig. 665, right side). When the infection penetrates the lower part of the uterus, the uterine veins and broad ligament veins generally become affected, and later the internal and common iliac veins.

Diagnosis

The diseases that may be confused with acute pelvic inflammation and that must therefore be taken into consideration in the **differential diagnosis** are as follows:

Acute endometritis.
Tubal pregnancy.
Appendicitis.
A tumor which has become gangrenous from twisted pedicle.
A suppurating tumor (usually a dermoid cyst or a necrotic fibroid).

In acute **endometritis** the bimanual examination shows that the tenderness is limited to the uterus. There is no marked tenderness in the periuterine structures, neither is any mass found there.

Tubal Pregnancy has been mistaken so many times for ordinary pelvic inflammation that the differential diagnostic points should be considered in detail (See Tubal Pregnancy).

In **appendicitis** the pain is more likely to start as a general abdominal pain, the point of greatest tenderness and the inflammatory mass, if there is one, being in the appendix region instead of in the tubal region. In appendicitis also there is frequently a history of stomach or bowel disturbance preceding or associated with the attack of pain, while in salpingitis there is usually a history of uterine disturbance—dysmenorrhea, prolonged menstruation, vaginal discharge and other indications of a previous or coincident uterine disease. In girls and in unmarried women an attack of inflammation low in the right side is much more likely to be appendicitis than salpingitis. In some patients both structures are involved.

In all right-sided inflammations keep in mind appendicitis. One having his mind too intent on pelvic disease may overlook this. This fact is very well illustrated by a case in which the author was called in consultation by a physician in this city. A few days before, the physician had operated for laceration of the cervix. Following the operation the patient developed pain in the lower abdomen and rapid pulse, and nausea and fever. The symptoms were persistent and progressive, and in three days the patient's condition became alarming. Fearing acute pelvic inflammation from infection at the site of operation, he asked for a consultation. Examination showed the cervical wound to be in good condition and nothing could be found in the immediate vicinity of the uterus to account for the serious symptoms. But on searching further it was evident the patient had appendicitis, with peritonitis. The vomiting and intraabdominal disturbance following anesthesia had evidently stirred to renewed activity an old focus of inflammation about the appendix. The patient had general peritonitis at the time when seen by the author and she died before the consent of her people to an operation could be secured.

In the case of a **tumor** which is **gangrenous** from twisted pedicle, the tumor has existed a long time, and one can usually get a history of pelvic disturbance caused by it, and in some cases a clear history of a tumor can be obtained. When the turning of the tumor with torsion of its pedicle takes place, that causes a sudden onset of serious symptoms—severe pain, extending more or less throughout the abdomen, and symptoms of shock. Later, as the tumor begins to degenerate on account of the cessation of its blood supply, local peritonitis comes on, causing fever. The local peritonitis may spread and become general peritonitis, and at this stage the origin of the trouble is much obscured. Absence of evidence of infected endometritis is another important point in the differential diagnosis of this condition from ordinary pelvic inflammation, as is also the absence of fever at the onset of the trouble and for several hours afterward.

A **suppurating tumor** is usually a **dermoid cyst,** connected with the ovary, and hence gives rise to a mass in the same region in which an inflammatory mass from salpingitis would be found. When suppuration takes place in an ovarian dermoid, there is resulting local peritonitis, with fixation of the mass by adhesions. The fever and pelvic pain and marked tenderness on examination all tend to further confusion with ordinary pelvic inflammation, making the differential diagnosis often very difficult and sometimes impossible. If the patient is a girl, or a woman who has never been pregnant or had any uterine infection, the probability is in favor of dermoid tumor and against salpingitis. Two other points in favor of the mass being a dermoid tumor are (1) a history of pelvic disturbance, pointing to the existence of a tumor before the acute symptoms developed, and (2) the absence of vaginal discharge and other evidences of uterine infection.

Necrosis or suppuration within a uterine fibroid presents the evidences of inflammation added to evidences (past and present) of a fibroid tumor.

Treatment

In the treatment of acute pelvic inflammation (acute salpingitis, acute oophoritis, acute pelvic peritonitis, acute pelvic cellulitis, and all combinations of these lesions), there are employed certain measures that may be called **general measures,** because they are applicable to all cases. There are employed also other measures that may be called **special measures,** because they are applicable to special conditions only.

GENERAL MEASURES

The general measures indicated in the treatment of practically all cases of acute pelvic inflammation, are as follows:

1. **Rest.**—Keep the patient in bed. If the inflammation is severe, she should use the bed-pan and should not be permitted to get up to a vessel beside the bed.

2. **Laxatives.**—The patient should have one or two good bowel movements daily.

3. **Hot Vaginal Douches** every six to twelve hours, the frequency depending on the severity of the inflammation.

4. **Applications to the Lower Abdomen.**—The hot applications are usually most effective in relieving pain. In exceptional cases the cold applications give more relief.

5. **Sedatives.**—If the pain is persistent in spite of the measures already mentioned, mild sedatives should be used, such as the bromides or preparations containing viburnum prunifolium. Avoid morphine unless the pain is

so severe as to make its use imperative, for it disturbs the stomach, checks the secretions and, in addition, masks the pain to such an extent as to interfere with our knowledge of the progress of the disease. The coal-tar antipyretics are also usually best avoided for the reason that they mask the fever. The pain and the fever are two important guides as to the progress of the inflammation, and hence should not be masked more than necessary. If there is much fever, cool sponging will give comfort and reduce the temperature and stimulate the patient, and its effect can be more accurately gauged than that of internal antipyretics. If there is much pain, of course sedatives must be given in sufficient quantity to give rest. Codeine phosphate or sulphate in one-half to one grain doses disturbs the stomach less than morphia and usually gives relief. If not sufficient, then morphia will be necessary. Whenever sedatives or antipyretics are given, their effect must be allowed for in reckoning the extent or progress of the inflammation.

6. **Foreign Protein Treatment.**—Vaccine or bacteria treatment may be given, but more effect is likely to be secured from the larger doses of foreign protein supplied by the intramuscular injection of sterilized milk. This method is being used extensively with excellent results in acute and subacute inflammation masses.

The milk may be sterilized by boiling eight to ten minutes, though some prefer to sterilize it by pasteurization. A good site for the injection is the outer half of the anterior surface of the thigh. The sterilized milk is injected slowly into the deep tissues of the thigh. The first injection consists of 5 c.c. to test the patient's reaction. The reaction is usually marked, the temperature rising in 8 to 12 hours, often going to 103° or 104°, and then subsiding. The subsequent injections consist of 10 c.c. of sterilized milk at intervals of three to five days, depending on the severity and duration of the reaction. The number of injections to be given depends on the condition and effects, six to ten injections comprising the usual course of treatment.

SPECIAL MEASURES

The special measures, indicated in certain cases of acute pelvic inflammation, are most conveniently presented by stating the particular conditions for which they are used.

1. If the infection has followed **labor** or **abortion**, it is desirable to have the interior of the uterus clean. Exploration of the interior of the uterus with the finger or with the curet may become necessary.

2. If the infection has taken place through an **operation wound** of the cervix, remove the sutures so as to give free drainage to the inflamed area.

3. If a collection of **pus** can be felt **low** in the pelvis, open and drain it by vaginal incision. It requires care to open a deeply placed pelvic abscess widely and safely, particularly if the pocket of pus is small. The rectum, uterus, uterine vessels, ureter or bladder may be injured, or the abscess may not be opened and drained thoroughly enough to effect a cure. The instruments required are shown in Fig. 737.

The **steps** in the **operation** are as follows:

a. *Examination Under Anesthesia.*—After the patient is anesthetized and the vagina thoroughly cleansed, make a bimanual examination to determine the size and relations of the inflammatory mass and what portion of it is fluctuating. Determine also whether or not the corpus uteri is forward and hence out of the way of the operative work.

b. *Incision Through Vaginal Wall.*—Introduce the self-retaining speculum or a simple perineal retractor, swab out the vagina again with an antiseptic solution, catch the posterior lip of the cervix with a tenaculum forceps and raise the cervix so as to expose the posterior vaginal wall. Now, with a long forceps, take firm hold of the posterior vaginal wall a short distance back of the cervix and then with a scissors or knife clip through the vaginal mucosa, between the forceps and the cervix (Fig. 738-A). The author usually uses the same blunt curved uterine scissors with which the subsequent dissection is made. By a little traction on the forceps a ridge of mucosa is raised which is easily clipped through with the scissors. The opening is then lengthened to each side, curving slightly around the cervix, until it is an inch to an inch and a half long. This gives an opening into the connective tissue back of the cervix.

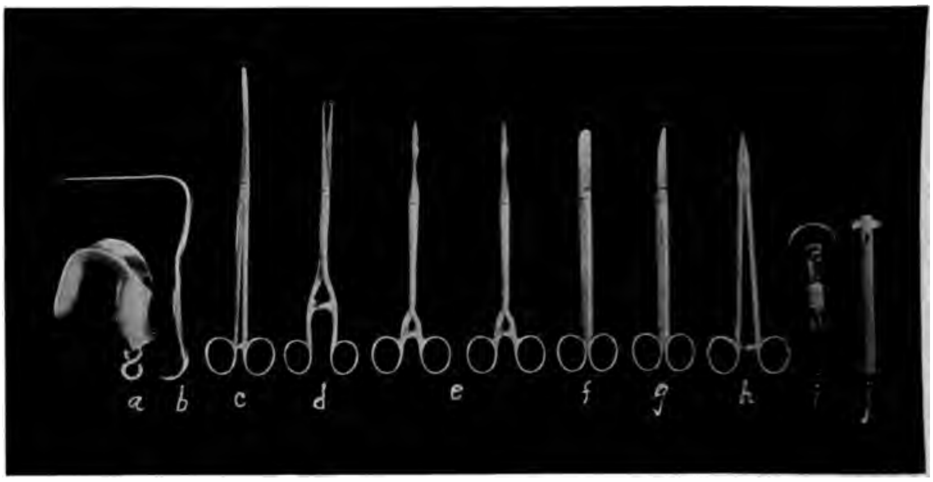
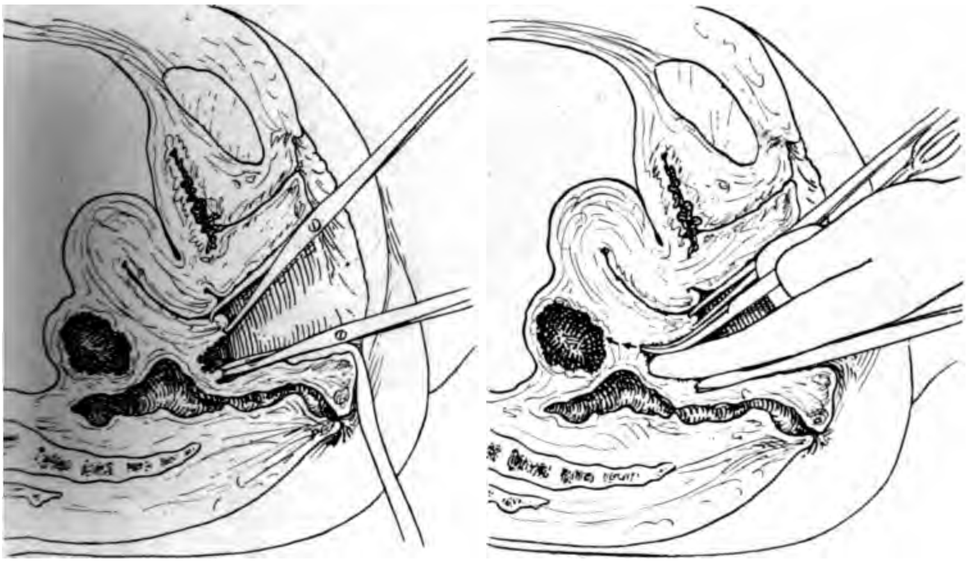


Fig. 737.—Instruments for opening pelvic abscess: *a*, self-retaining speculum; *b*, perineal retractor; *c*, vaginal dressing forceps; *d*, uterine tenaculum forceps; *e*, two long artery forceps; *f*, long, curved, blunt scissors; *g*, long, curved, sharp-pointed scissors; *h*, needle holder; *i*, needle and ligature, for use in case of unusual hemorrhage; *j*, drainage tube with cross-piece.

c. *Blunt Dissection Through Connective Tissue.*—This is most safely and conveniently accomplished by the sense of touch alone. The speculum, or perineal retractor, is removed and two fingers are introduced into the vagina, one of the fingers being carried into the wound back of the cervix. With this finger, blunt dissection is made upward through the connective tissue, keeping close to the wall of the cervix, which is distinguished by its greater hardness. This dissection is facilitated by introducing the closed blunt scissors some distance ahead of the finger as shown in Fig. 738-B, and then opening the scissors widely. The finger is introduced into the opening thus made in the connective tissue, and the scissors are again introduced beyond the finger and opened widely. In this way a wide tract may be made rapidly through the connective tissue, and it may be made safely, provided the operator keeps close to the cervix as indicated in Fig. 738-B. Each arrow in this illustration may be taken to represent a forward thrust of the blunt scissors beyond the end of the finger. Notice that the direction of the dissection carries it between the uterus and the abscess instead of between the rectum and the abscess and thus the danger of tearing into the rectum is avoided. On the other hand, the dissection must not be carried into the cervix uteri. Involvement of the tough tissue of the cervical wall is indicated by the blunt dissection becoming very difficult while still some distance from the abscess.

d. *Puncturing the Abscess Wall.*—When the wall of the abscess is reached, further advance by blunt dissection becomes very difficult or impossible. This wall of dense infiltration blocking further advance is especially marked in a long-standing abscess, but it is present in acute abscesses also to a considerable extent. The blunt scissors are now exchanged for the sharp-pointed scissors (Fig. 739-A), and with these the puncture is made into the center of the inflammatory mass. Care must be taken to make sure that the puncture will not extend into the rectum. A hard fecal mass in the rectum may be mistaken for a portion of the inflammatory mass, or a gas-distended part of the rectum may simulate the soft, elastic feel of a fluctuating mass, or a collapsed pocket of the rectum may project between the vaginal vault and the abscess. In Fig. 738-A this dangerous proximity of the rectal wall to the



A. *B.*

Fig. 738.—Opening a pelvic abscess. *A*, Incision through vaginal wall. The retractor has been introduced, the cervix caught with a tenaculum forceps, and the vaginal wall clipped through just back of the cervix. *B*, Blunt dissection through connective tissue. The retractor has been removed to permit the fingers to be introduced into the vaginal incision, and dissection is now being made through the connective tissue with fingers and blunt scissors, as described in the text. The arrows show the direction of the dissection (between abscess and uterus and not between abscess and rectum), and each arrow may be taken to represent a forward thrust of the blunt scissors beyond the end of the finger.

operative tract is well shown. If the line of blunt dissection is kept close to the uterus, the abscess wall is reached close to the uterus, with a considerable part of the abscess lying between the point of puncture and the rectum, as shown in Fig. 738-B. Should there be any doubt about this, leave the scissors in the tract and, with gloved fingers, make an examination per rectum. This examination gives a clear idea of the amount of tissue between the point of intended puncture (indicated by the end of the scissors) and the nearest portion of the rectal wall.

After the curved, sharp-pointed scissors have been pushed into the center of the mass, they are opened widely and then withdrawn while still wide open. This makes a large tract into the abscess. One or two fingers are then introduced into the cavity and its wall explored for secondary pus pockets. If a fluctuating area is found, it may be opened by the finger, dressing forceps or scissors, care being taken to avoid wounding the rectum or mistaking an adherent knuckle of intestine for a fluctuating pus pocket. While an adherent loop of intestine may feel soft and elastic, it never presents the tense fluctuation and resistance of a pus pocket, unless obstructed. In this palpation of the interior of the abscess cavity, all manipulation should be made gently, so as not to break through the protecting roof of exudate.

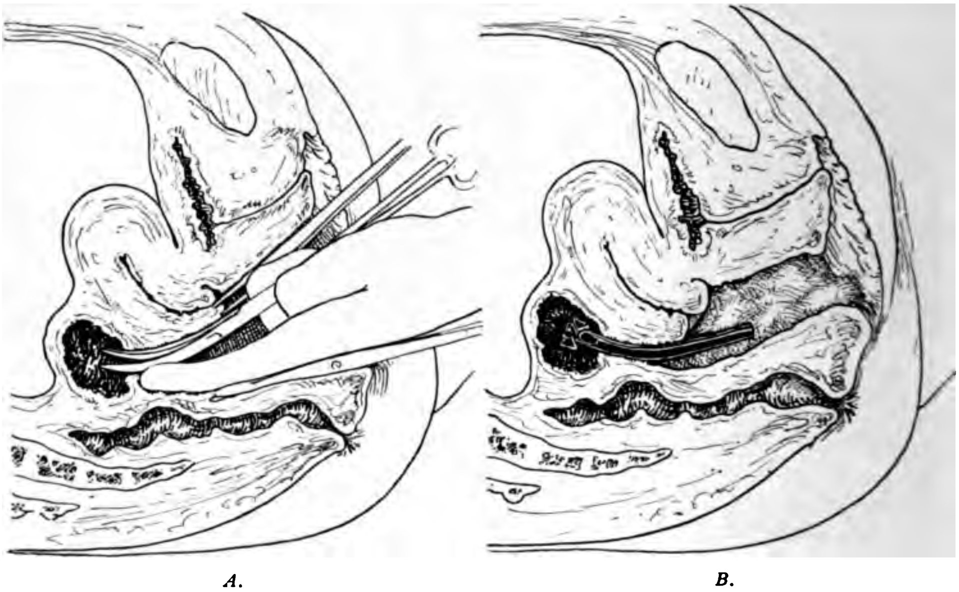


Fig. 739.—Opening a pelvic abscess. *A*, Puncturing the abscess wall. The sharp-pointed scissors have been introduced into the mass under the guidance of the finger, and then opened widely. *B*. Drainage tube in place. The cross-piece is to prevent the tube slipping out. The tube is cut off about midway of the vagina. The gauze packing extends into the connective tissue area about the tube, but not into the abscess cavity.

e. *Drainage.*—After all pus pockets are opened, introduce a good-sized drainage tube into the abscess cavity (Fig. 739-B). Swab out the vagina and pack it lightly with antiseptic gauze. The upper end of the gauze should be packed rather firmly into the connective tissue about the tube, so as to stop any bleeding there. The gauze is to be packed only a short distance into the wound, so that it will not pull out the tube when it is removed, for the rubber tube is to be left in place until the cavity is nearly obliterated by granulation, which requires two to six weeks.

The drainage tube will not stay in place without some special device. A very convenient expedient is to introduce a short piece of a smaller tube crosswise through holes cut near the end of the main tube (Fig. 740). This drainage-tube is introduced into the abscess cavity by grasping it with a long forceps as shown in the illustration. When in place, the forceps are removed

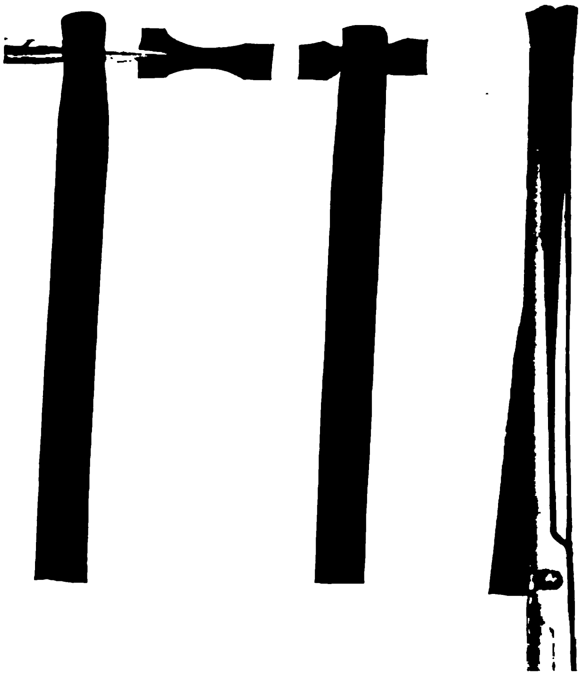


Fig. 740.—Showing how to arrange a drainage tube with a small cross-piece at the end to keep the tube from slipping out of the cavity. To introduce the tube, the cross-piece is turned up on each side and the end of the tube is grasped with a forceps, as shown at the right.

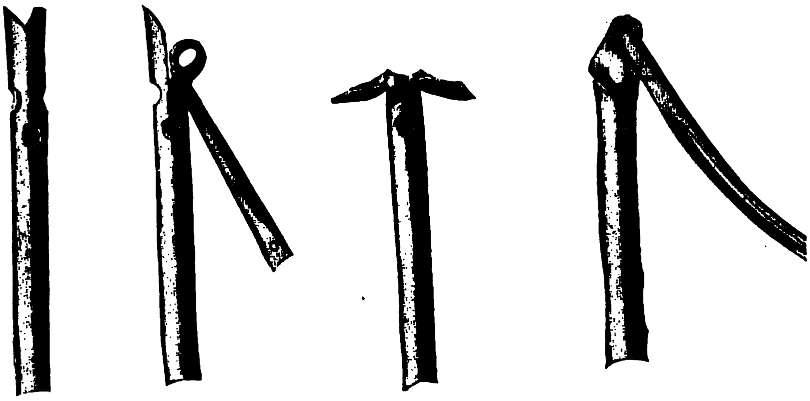


Fig. 741.—Another method of arranging a cross-piece on the end of a drainage tube to keep the tube from slipping out of the cavity. (Reed—*Textbook of Gynecology.*)

and the cross-piece resumes its original position, and thus prevents the tube slipping out of the cavity. When it is desired to remove the tube, slight traction causes the ends of the cross-piece to fold up, and the tube is removed with but little pain. Another method of forming a cross-piece on the tube is shown in Fig. 741, and such a tube is shown in place in Fig. 639-B. After the tube is in place, its lower end is cut off about the middle of the vagina and the vaginal gauze packing is distributed around it. If the tube is allowed to extend outside the vaginal entrance, it causes more or less irritation of the external surfaces, and if it is cut too short it may slip up into the abscess cavity and be lost.

Errors to Avoid.—One error to avoid is **irrigation of the cavity.** The free opening of the abscess relieves the tension, and this, with the subsequent drainage, is all that is required. Furthermore, if a stream of fluid is run into the cavity, it may break through some weak place in the protecting wall and cause infection of the general peritoneal cavity. Irrigation, therefore, is not only unnecessary, but dangerous, and may cause fatal peritonitis in a case that would have recovered promptly under simple drainage.

Another error to avoid is **dependence on gauze drainage.** A considerable proportion of failures and secondary operations are due to this. When there is a distinct abscess cavity, there will necessarily be discharged for some time, and this discharge should find ready exit through tube drainage. Gauze packing is very good for checking bleeding or for holding the tract open for a few days, but it is not satisfactory when prolonged drainage is necessary, and prolonged drainage is necessary in practically all cases where a distinctly walled abscess has formed. In the crowded and contracting tissues of the pelvis, tube drainage is the only kind that will keep the drainage tract open satisfactorily and conveniently for the length of time required for a large cavity to become obliterated by granulation. And the best time to place this tube drain satisfactorily is when the patient is under the anesthetic and the abscess just opened.

Variations.—In a case of tubal abscess where the pus has not yet escaped from the fallopian tube, the culdesac of Douglas is opened before the abscess proper (tube wall) is reached. The culdesac may or may not be shut off from the general peritoneal cavity by adhesions. In some such cases a small amount of serous fluid escapes when the culdesac is opened. Exploring this nonpurulent cavity, the finger encounters the distended, fluctuating tube, which is then opened, with a resulting free discharge of pus. Two points of importance in such a case are: first, to make a free opening in the wall of the distended tube, and, second, to place the end of the drainage tube inside the affected tube and not simply in the culdesac.

In draining a broad ligament abscess, opening the peritoneal culdesac. Such opening is unnecessary and is dangerous, for the uninfected culdesac is not likely to be walled off from the general peritoneal cavity. In operating in a case where the inflammatory mass is situated laterally, the vaginal wall is cut through as before, and then the dissection is directed laterally between the layers of the broad ligament. In this way a collection of pus situated even in the upper part of the broad ligament may be drained freely without opening the peritoneal cavity.

In an acute inflammatory mass without pus it may in certain cases be advisable to drain. In a considerable proportion of inflammatory masses it is impossible to say positively before operation whether or not there is a pocket of pus in the mass. If general symptoms are threatening and the mass is increasing in size and tenderness, drainage is advisable—on the general surgical principle of immediate drainage of an acute infected focus that Nature is failing to limit. In such a case the steps are the same as for a distinct abscess—viz., blunt dissection through the connective tissue, puncture to the center of the mass with sharp-pointed scissors and enlargement of the tract by withdrawing the scissors wide open. The interior of the mass is then palpated with one or two fingers and perhaps opened further in various directions. If no pus is found, the cavity is packed lightly with gauze. As there is no distinct pus cavity, there is no indication for tube drainage. However, if when the gauze is removed after two or three days a free purulent discharge is present (due to an adjacent pus pocket opening into the cavity or to the advancement of the inflammatory process to the point of suppuration), then a small drainage tube with cross-piece should be introduced at the time the gauze is removed. If no pus is present, no tube drain is required—simply vaginal douches, with or without light gauze-packing of the tract, as preferred. The author has seen, in a number of instances, marked relief from pain and rapid resolution follow this puncture and drainage of an acute inflammatory mass without distinct pus formation.

f. *After-treatment.*—In the after-treatment of an opened pelvic abscess the two important points are (1) continued free drainage until the cavity has been practically obliterated by granulation, and (2) avoidance of unnecessary irritation, such as repeated packing or probing of the tract, or frequent syringing of the abscess cavity.

Neglect of the first point is the cause of the failure in a large proportion of the cases where the abscess reforms and requires secondary operation—that is, when the case has been well chosen and is really suitable for vaginal drainage. The neglect of the second point causes much unnecessary pain and irritation by repeated probing and packing of the suppurating tract, and also contributes to failure by early removal of the well-placed rubber drainage tube, which is the only efficient method of continued drainage in this situation.

The gauze in the vagina is removed in one or two days and after that an antiseptic vaginal douche is given one to three times daily, the frequency depending on the amount of discharge. The patient is kept in bed for a week; and after that, if there is no pain or fever, she is allowed to be up and about. If the tube stops up at any time, it may be cleared out by injecting some hydrogen peroxide into it. If this does not clear it, it is probably stopped by a slough or fibrinous mass. Remove the tube, and after clearing it thoroughly, reintroduce it or a smaller one. For changing the tube or for any manipulation about the opening back of the cervix, the Sims posture is more convenient than the dorsal posture.

The tube should be left in place as long as there is a cavity to discharge—varying in different cases from two to six weeks. If after the large tube has been in for a week, the patient complains of pain on bowel movement or other pain in pelvis, remove the tube and introduce a smaller one. As the abscess cavity contracts, it is necessary to reduce the size of the tube and cross-piece sufficiently to prevent pressure-ulceration of the rectal wall. Continue the douches for at least a week after tube is removed and all discharge has ceased.

4. If a **collection of pus**, or a **mass of exudate** that may or may not contain pus, is found high in the pelvis, do not disturb it during the acute attack unless the patient's life is threatened by the severity of the process. Avoid abdominal operation in the primary acute attack, if possible. There are two reasons for this—first, the patient may recover completely under the minor measures (rest, laxatives, hot douches) and, second, if extirpation of the mass is finally necessary, it can be carried out later with much less danger to the patient. There is no less danger later because collections of pus in the pelvis become less virulent after a time. In many old pelvic abscesses the bacteria are dead and the pus sterile, and extensive contamination of the field of operation fails to cause peritonitis. If, on the other hand, the operation is done early while the bacteria are still virulent, contamination of the field is very likely to result in fatal peritonitis.

In mentioning the fact that the majority of inflammatory masses in the pelvis become sterile after a time, attention must be called to an exceptional class—namely, the streptococcal cases. In the streptococcal masses automatic sterilization or attenuation is uncertain. Though sometimes present, its occurrence can never be counted on. In streptococcal masses the bacteria have been found active and virulent after long periods—even years. Consequently, in these cases intraperitoneal operation is never safe. The persistence of virulence in streptococcal cases, how to recognize them before operation, what to do for them when operation is necessary, and other points of interest are considered in detail under chronic inflammatory masses in the pelvis.

In acute inflammatory masses, whether streptococcal or gonococcal, intraperitoneal operation is to be avoided. Those abscesses situated high are the ones now under consideration. If the symptoms are urgent, and the pocket of pus cannot be reached and drained per vaginam, it may be possible to drain it extraperitoneally by operation above Poupart's ligament. This is entirely practical when the abscess is situated in the broad ligament (as most streptococcal abscesses are) and it has proved a life-saving measure in several instances. The route followed is the same as for ligation of the external iliac artery. In all but exceptional cases, however, an abscess in any part of the broad ligament can be reached and drained satisfactorily per vaginam by any one familiar with vaginal work.

5. If the inflammation takes the form of a **rapidly-spreading peritonitis**, with little or no limiting exudate, or in spite of limiting exudate, the peritoneal cavity should be opened and drained, either by vaginal section or abdominal section or both. Such cases are seen principally in pelvic inflammation following labor or miscarriage and constitute a severe type of puerperal sepsis. The

inflammation may have extended directly through the wall of the uterus to the peritoneum, or first to the fallopian tubes and from there to the peritoneum. In either case there is a rapidly spreading peritonitis of virulent type and the patient is in a desperate condition. There are two methods of dealing with these cases:

Vaginal Section.—Open into the pelvic cavity by posterior vaginal section and let the infected peritoneal fluid run out. Palpate the uterus and appendages, and, if a collection of pus is found, evacuate it. Put in a large size rubber drainage tube and pack the pelvis lightly with gauze, letting the ends extend out into the vagina. Washed iodoform gauze has been recommended for this intraperitoneal packing, but several instances of iodoform poisoning from absorption have been reported. It is safer to use plain gauze wrung out of a weak bichloride solution. The principal effect desired is drainage and this is accomplished by the rubber tube. The gauze packed in the wound about the tube checks the bleeding, and preserves a good-sized cavity about the tube, and thus drains the entire pelvis instead of a small sinus, which might be all that would remain were the structures allowed to collapse about the tube immediately after its introduction. Gauze is then placed in the vagina and a large dressing applied over the vulva, and the patient put to bed. The gauze in the vagina may be removed in twenty-four hours, the vagina cleansed, and fresh gauze inserted or douches given, as preferred. The gauze in the pelvis should be left in place from two to four days, provided there is good drainage during that time. When it is removed, reintroduce the rubber drainage tube to insure good drainage and keep the vaginal wound from closing too soon.

Abdominal Section.—Open the abdomen by incision in the median line and make free drainage with a glass tube to the depth of the pelvis, with or without removal of the affected tube or tubes, as seems best in the particular case.

Of the two methods of pelvic drainage, the first (vaginal section) is the preferable one in the majority of cases of acute virulent pelvic peritonitis if the inflammation is still confined to the pelvis. When the general peritoneal cavity is not involved, vaginal section accomplishes all the important results that can be accomplished by abdominal section—the emptying of pus pockets and free drainage of the infected area—and with much less danger to the patient. Of course, if the infection has already extended to the higher portions of the peritoneal cavity, there may be pockets of septic fluid in the central abdomen which cannot be evacuated from below. Under such circumstances abdominal operation is usually required, either alone or in combination with vaginal drainage. In addition to drainage of the infected peritoneal cavity by vaginal section or abdominal section, or both, there are certain other measures of much importance in acute peritonitis—namely, stomach lavage and withholding nourishment by mouth (to prevent injurious intestinal peristalsis), Fowler posture (for drainage) and the introduction of ge quantities of normal saline solution into the system (to strengthen the organs and aid elimination).

The **treatment of acute spreading peritonitis** of virulent type has undergone a radical change in the last few years and with remarkable reduction in the mortality. Formerly 80 to 90 per cent of these patients were lost. Now 80 to 90 per cent are saved. This splendid result has been obtained by a more intelligent aiding of nature in the **limitation**[*] of the infective process and in the **elimination** of the infective material. In order to bring out the essential features in handling these cases of general peritonitis, or of local peritonitis threatening to become general, it is necessary to say a few words in regard to Nature's efforts at caring for them. The process is best studied where a quantity of infective material is liberated suddenly in the peritoneal cavity, the best examples of which are seen in perforations of the intestinal tract. The most common of these is perforation of the appendix. Hence, the great advance in the treatment of peritonitis of virulent type has been made largely from the study and treatment of cases of perforative appendicitis. In this study it has been established that, in Nature's attempt to protect the system from the infective material, there are three important factors, as follows: a. A wall of exudate which surrounds the infective material, binding together the adjacent surfaces, and opposing an organic barrier to the spread of the infection. b. Immobilization of the intestinal coils, which prevents mechanical spread of the infectious material, such as would necessarily take place in the presence of normal intestinal peristalsis. This immobilization of the intestinal coils is formed in part mechanically by the adhesions forming the wall of limiting exudate and in part physiologically by the anorexia, which causes very little food to be taken, and by the vomiting, which rejects a large part of that which is taken. c. Elimination—first of the toxins through the kidneys and other eliminative organs, and, second, of the infectious material itself through an opening to the external surface of the body or into some hollow organ.

Such in brief is Nature's method of handling these cases. The results vary with the virulence of the infection, the vital resistance of the individual, and the efficiency of the outside help. These are desperate cases. With or without outside help, the patient's life hangs in the balance, and every move that is made should be made with the idea of aiding Nature and not handicapping her. Such intelligent assistance can be given only by a well-balanced consideration of each of the three factors above mentioned. One or another of these factors has at various times been given undue prominence in the treatment. The old opium treatment considered the immobilization and the exudate, with practically entire neglect of elimination, either general or local.

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[*] This limitation of the infective process is effected by the inflammatory infiltration and exudate and adhesions. These features are protective and constitute Nature's method of combating the spread of the infection. The protective features of inflammation have been strongly emphasized in recent years by a number of writers, particularly by Channing W. Barrett, who states in a recent article: "Inflammation is not the fire, it is the fire department; it is not the epidemic, it is the health department; it is not the army of invasion, it is the army of defense." However, in combating the old idea that inflammation was wholly a destructive process, there is no reason to go to the other extreme and try to label it as a wholly constructive or protective process. Peritonitis (or inflammation in any other situation) is a complex condition, and any complete conception of it must include both the invading organisms and the resisting forces. The term "peritonitis" is used, and it seems rightly used, by clinicians to designate the conflict between these opposing forces and the usual results thereof. To use the simile of the writer above quoted: Inflammation is not the army of invasion, neither is it the army of defense—it is the *conflict* between the two. In one case it is a short sharp local fight, while in another case it is a prolonged conflict along a far-flung battle line, that may involve the whole body.

The later treatment by operation, widespread irrigation and mopping of peritoneal surfaces, and extensive drainage, was based upon an exaggerated idea of the importance of elimination and an erroneous idea as to how to best secure the really necessary elimination. This method, which was practiced generally a few years ago, took almost no account of any factor save drainage.

In the present method of treating such spreading peritonitis the **wall of exudate** is preserved as far as possible by employing simple drainage without irrigation or extensive exploration, or any other manipulation, except that necessary to give exit to the infected material and perhaps remove a sloughing structure or close an opening into the intestinal tract. The **immobilization** of the adjacent intestinal coils is favored by leaving the adhesions and by quieting intestinal peristalsis through withholding all food for a few days and through stomach washings. **Elimination** is secured through simple drainage of the infected site and, when needed, of the pelvic peritoneal pouch, aided by the half-sitting posture (Fowler's posture) and the free use of normal saline solution, particularly by slow continuous rectal absorption (proctoclysis).

This combination treatment has reduced the mortality of acute general peritonitis from 80 to 90 per cent to 10 per cent, and even below. This remarkable result is well established and unquestioned. However, there is considerable difference of opinion as to the relative importance of different factors in the treatment. J. B. Murphy was the first to arrest the attention of the profession generally, and focus it on this subject, by the report in 1905 of a series of 29 cases of acute general peritonitis with 28 recoveries. Murphy laid stress on three factors—viz., simple drainage (without irrigation or other extensive intraperitoneal disturbance), the Fowler posture and proctoclysis. A later report of his experience gives 58 cases with 56 recoveries. Other operators have secured nearly as good results by this treatment, so that it is now very generally employed with the saving of many patients. A. J. Ochsner has rendered valuable service by emphasizing the necessity of intestinal mobilization by withholding all food and washing out the stomach. This is important both before operation and after operation until the process is well localized. Ochsner laid special emphasis on its use before operation and in certain carefully selected cases, instead of operation during the acute stage. This last recommendation, of using it to the exclusion of operation in certain desperate cases, is a questionable one at present. When this treatment was first proposed as a substitute for immediate operation in the carefully selected cases belonging to that fatal class generally recognized as "too late for early operation and too early for late operation," it undoubtedly saved many patients, for it was opposed to the extensive operation and general irrigation treatment then in use, which gave a mortality of 80 to 90 per cent. By absolute rest of the stomach and upper bowel, secured by painstaking attention to detail, Ochsner was able to tide the patients over the critical period and operate later with a reduction of the mortality to one-fourth what it was formerly—i.e., to the neighborhood of 20 per cent. With the substitution of simple drainage, however, for extensive operation in these cases, the serious objections to operation (shock and mechanical spread of the infection) have practically disappeared even in the most desperate cases. When the patient is so weak that general anesthesia is not advisable, the simple drainage may be made under local anesthesia and the exit of infected material through this vent may turn the tide of battle to the saving of the patient. That this is true is shown conclusively, it seems, by the fact that Murphy, employing drainage associated with other less important features, was able to save 56 out of a series of 58 cases—reduction of the mortality to less than 4 per cent.

Associated with drainage, stomach washing and intestinal rest are important features, both before and after operation. In fact, some insist that the splendid results which attend the "Murphy treatment" are due, aside from drainage, almost entirely to the stomach and intestinal rest so strongly emphasized by Ochsner. In a recent article, G. S. Brown, in support of the contention, reports a series of 17 cases of diffuse peritonitis with 14 recoveries, in which the treatment employed was drainage by operation combined with the antiperistaltic regime of Ochsner, "without the use of the Murphy-Fowler features." It is difficult to decide certainly as to the relative importance of each of the factors which enter into the present successful treatment of extensive peritonitis. There are several reasons for this. There are certain essential technical details about some of the factors that are not always fully comprehended and carried out, hence confidence may be lost in one or another feature of the treatment simply through the inefficiency of the one who employs it. Again, physicians differ much as to the cases they classify under "acute diffuse peritonitis," thus causing a marked difference in the mortality records. Still again, the combination method generally employed, while contributing to splendid results, contributes also to uncertainty as to the relative importance of the various features. This uncertainty is mentioned not to discourage the use of the combination treatment, but simply to call attention to the fact that there is probably good in each of the features and that it is not wise to make positive statements as to the exclusive sufficiency of this or that feature until we have acquired more definite knowledge through further experience.

The **combination treatment** for acute spreading peritonitis considered best is, in detail, as follows:

a. **Withhold all Food and Cathartics by Mouth and Empty the Stomach With a Stomach-tube.**—As soon as an acute spreading peritonitis is recognized, arrangements should at once be made for a drainage operation. The sooner the infecting material is given an external exit, the better will be the patient's chance for recovery. While preparing for the operation, however, and also subsequent to operation, this antiperistaltic treatment is indicated. There are certain details that must be carried out to the letter to secure the best results. No food of any kind is to be given by mouth, not even a teaspoonful of liquid nourishment. The least nourishment taken into the stomach and passing into the intestine will excite intestinal peristalsis and defeat the purpose of the treatment. Also, the food already in the stomach will excite peristalsis unless removed. Very often considerable has been removed by vomiting, but vomiting is not to be depended upon. Though the patient has vomited several times, still there may be enough food remnants remaining to pass into the intestine and excite it to action. In fact the persistence of vomiting indicates the presence of some irritating material in the stomach. Consequently, the stomach-tube should be used to insure thorough emptying of the stomach in every case, except where there is some special contraindication to its use (ulcer of stomach, carcinoma, child too young, etc.).

The gastric lavage may be simplified and made less disagreeable by attention to details. Turn the patient well over on the side, preferably the side in which the inflammatory process is located. Spray the pharynx with a 4 per cent solution of cocaine, spray it three or four times in the course of five minutes, directing the patient to hold the solution in the pharynx for a few seconds and then expectorate it. The stomach-tube should be of good size, with an opening at the side as well as at the end. Cool it in ice water and introduce it without special lubrication—simply wet with the ice water. Direct the patient to assist the passage of the tube along the esophagus by swallowing repeatedly. Gastric lavage has come into such general use in the treatment of postoperative gastric dilatation and other conditions, and is so necessary, that a physician having anything to do with an abdominal case should know how to introduce the stomach-tube without disturbing the patient overmuch. When the tube has reached the stomach, siphon out the contents. Then introduce warm normal saline solution and siphon it out repeatedly until it returns clear. Use a pint and more if necessary, and at the end empty the stomach as nearly as possible.

This gastric lavage makes the patient more comfortable. It gives the stomach rest from irritating decomposing material, diminishes the peristalsis, diminishes the distention, and stops the vomiting, which in itself does harm by disturbing the limiting adhesions. The one stomach washing may be all that is needed. If the vomiting recurs, however, lavage is again indicated, for it means usually that reverse peristalsis has brought material from the upper intestine into the stomach, and this should be removed by the tube as was the first. In Nature's method of localizing the infection, inhibition of peristalsis in adjacent intestinal coils (temporary intestinal paralysis) is an important factor. If there is food in the upper intestine, it excites peristalsis. Now, this normal peristalsis and onward progress being interfered with by the immobilization of certain intestinal coils, there is reverse peristalsis, which carries the irritating material back into the stomach, where it is partially thrown off by vomiting. The continued administration of food, and especially of cathartics, aggravates the peristalsis and reverse peristalsis, adding much to the patient's danger and discomfort. Two or three extra stomach washings at intervals of several hours may be necessary before complete rest of the stomach and bowel is secured. This complete emptying of the stomach and upper bowel has a very decided effect within twelve to twenty-four hours. There is cessation of the vomiting and diminution of the nausea, distention, pain and fever. The pulse and respiration improve, and the discomfort and threatening symptoms disappear to a large extent. Ochsner remarks, "Usually the improvement is so rapid that one is tempted to spoil everything by giving nourishment by mouth, because the patient's condition does not seem serious enough to warrant such severe deprivation measures." This treatment is to be used while arrangements are being made for operation and it is to be used also after operation, along with the Fowler posture, proctoclysis and rectal nourishment until the inflammatory process is well localized and stomach feeding may be safely resumed.

b. **Drainage of the Infected Area, With the Least Possible Intraperitoneal Disturbance.**—This should be carried out as soon as possible. There should be no irrigation and no breaking of adhesions, beyond that absolutely necessary to drain the pus pocket or pockets and, in certain exceptional cases, to remove sloughing tissue or close a hole in the intestinal wall. The anesthesia should be of the shortest possible duration, in order to diminish the further burden on the already overburdened eliminative organs. In some cases the drainage operation can be carried out largely or wholly under local anesthesia, aided by a dose of morphine given about half an hour before. As a rule tube drainage in some form should be employed, with or without gauze, as preferred. If the pelvic peritoneal culdesac is to be drained through an abdominal incision, the glass tube is best. In other situations rubber tubing is preferable. It may be split spirally or longitudinally, or may have holes cut in the sides. If the drainage is made per vaginam, the drainage tube should have a cross-piece (Fig. 739) to prevent it slipping out, for in this situation the tube must remain a long time, as previously explained. In cases where there are several pockets which cannot be drained satisfactorily through one tube, it may be necessary to put in two or more tubes, bringing them out through the same opening in the abdominal wall or through separate openings.

c. **Posture.**—Immediately following the vaginal drainage operation the head of the bed should be raised two feet. This causes all fluid in the peritoneal cavity to gravitate to the pelvis, where it escapes through the drainage tube. As soon as the patient is strong enough—that is, within a day or two—this drainage may be more comfortably and efficiently maintained by the regular Fowler posture—half-sitting posture.

If the drainage is made by abdominal incision the prone or ventral posture is the preferable one. Hill (Trans. Western Surg. Assn., 1917) presented series of cases of peritonitis treated by the prone posture and by the Fowler posture, with decidedly better results in the former. Lying on the abdomen greatly favors drainage through the abdominal incision and the position has proved to be as a rule comfortable for the patient, care being exercised to avoid direct pressure on the wound.

d. **Proctoclysis.**—The introduction of normal saline solution into the system gives important aid to the heart and kidneys, and facilitates the elimination of septic material. If the patient is very weak immediately after the drainage operation, one or two pints of the solution may be given subcutaneously. At the same time the giving of the solution by the rectum should be begun, to be continued for several days. It is best given by slow continuous absorption. To secure this, certain essentials must be observed, as follows: (a) the fluid, normal saline solution or tap water, must be maintained at a temperature of about 100° F., (b) it must flow into the rectum slowly, drop by drop (about one and a half pints per hour), and (c) there must be no obstruction or constriction in the tube that would interfere with the free regurgitation of fluid or gas from the rectum. The apparatus, whether simple or elaborate, must conform to these essentials. The success of the method depends upon accuracy in its application.

Proctoclysis is started as soon as the patient is returned to bed after operation. Irrigator can (Fig. 742) is filled with normal saline solution or plain tap water of 100° F. and an electric light bulb, specially wrapped, placed in it to maintain the temperature. The irrigator can is placed just above the level of the rectum (see directions under Fig. 742). Screw is adjusted until the desired flow is obtained, usually between 30 to 50 drops to the minute, as is accurately ascertained in the glass bulb. Then the rectal tip is carefully inserted deep into the rectum. Flatus may escape through tube attached to edge of irrigator by means of the curved glass tube. If patient is unable to retain the fluid, the flow is either stopped temporarily or, preferably, the flow is reduced to 30 drops or even less to the minute.

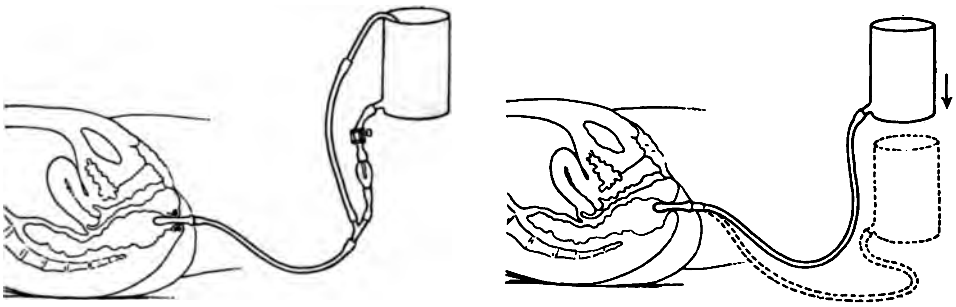


Fig. 742.—Effective proctoclysis. *A*, Two-tube apparatus, with clamp for regulating flow, visible dropper for estimating rate of flow and the overflow tube for back pressure. Notice that the solution container is placed *low*, so as to reduce the pressure on the column of fluid in the rectum. This is an important technical detail in giving proctoclysis. If the container is high, the increased pressure in the rectum is very likely to excite contractions with resulting expulsion of the fluid. The bottom of the container should be almost on a level with the rectum, so that there is practically no pressure on the column of fluid even when a cough or other strain works the overflow. *B*, One-tube apparatus in which the rate of flow must be regulated by lowering or raising the container.

e. **Nourishment per Rectum.**—Give an ounce of some one of the reliable predigested foods to three ounces of normal saline solution every four hours. This may be given by the drop method instead of like amount of plain normal saline solution, or it may be given as an ordinary low enema if it is desired to remove the tube for a time. No large enemas are to be used during the acute stage, as they might excite intestinal peristalsis. After the process is well localized and the threatening symptoms have disappeared, stomach feeding may be gradually resumed.

f. **Vaccine and Foreign Protein Treatment.**—There are various measures that tend to increase the patient's resistance, and these aid in checking the progress of the infection. In most cases the treatment already mentioned will suffice to effect a cure. In exceptional cases, however, the infection still continues to spread and threaten the patient's life. This is seen not infrequently in certain puerperal infections—puerperal peritonitis, puerperal cellulitis and particularly in puerperal septic thrombophlebitis. All surgical indications having been promptly met, we are not yet through, but must use every possible means to increase the patient's vital resistance. There is now a severe conflict and in some cases a prolonged conflict between the invading bacteria and the defending forces of the body. Measures that increase leucocytosis, and strengthen the other resisting forces, aid Nature in the fight and may decide the issue favorably.

Foreign protein treatment may be pushed carefully in the form of stock bacterins in regular and increasing doses. If the blood culture shows bacteria it is well to make an autogenous vaccine. If the patient is strong enough to stand considerable reaction, the larger doses of foreign protein in the form of sterile milk may be given.

Blood Transfusion, etc.—Employ the various other measures used to increase or conserve the patient's vital resistance; namely, concentrated nourishment, stimulants, laxatives, sedatives, ec., according to usual indications. If the patient is markedly anemic and low in vital resistance, blood transfusion may be very helpful. Polak (Am. Jour. Obst. and Gynec., Sept., 1919) advocates the routine employment of repeated small blood transfusions in cases of bloodstream infection.

6. **Septic Thrombophlebitis.**—The nature and ramifications of this process have been indicated under pathology of pelvic inflammation, and as long as the septic process is confined to accessible veins, there is still a chance to limit it artificially by ligation of the affected veins proximal to the infection. This subject is still in the experimental stage. A number of patients have been operated on. Some good has been accomplished, and there is promise of more for the future. Whenever a puerperal septic patient has repeated chills and high fever, persisting after the uterus has been cleared out, and with no general lesion or palpable local lesion to account for these manifestations, the question of septic thrombosis and possible operation should be considered. In these cases it is important also to employ the measures mentioned above for increasing the patient's resisting power.

7. In a case of apparent pelvic inflammation where the **diagnosis is doubtful**, operation may be indicated on account of the probability or possibility of some other condition, which would require operation at once—such. for example, as tubal pregnancy or appendicitis or a suppurating tumor. As a rule, in any of these conditions, if the symptoms are severe, immediate operation is necessary. Consequently, in doubtful cases, where these conditions cannot be excluded, if the patient is growing worse, operation at once is indicated.

Prognosis

What ultimate results can be expected in these cases of acute pelvic inflammation? What is the after-history of these patients?

For the purpose of prognosis it is convenient to divide the cases into two classes—(A) those not requiring operation and (B) those that do require operation.

A. If the patient can be tided over the most acute stage of the attack **without operation** one of the following terminations will take place:

1. **Complete Recovery.**—In these cases the germs are destroyed, the plastic and serous exudate is absorbed, the pains disappear, the patient comes to feel well and functional activity is restored. That such a termination does take place even in some severe cases is proved conclusively by the cases of salpingitis and pelvic peritonitis, from infection following labor or abortion, in which the patients eventually recover and have good health and bear children. No doubt a few adhesions remain, but not enough to cause pain or to interfere with function. This very desirable termination is much more liable to take place in ordinary septic inflammation than in gonorrheal inflammation. In gonorrheal inflammation the immediate danger to life is not so marked as in other forms of pelvic infection, but the ultimate danger to health in the cases that survive is much more marked. In a much larger proportion of the gonorrheal cases the acute trouble is followed by serious chronic pelvic inflammation, causing sterility and persistent invalidism.

2. **Partial Recovery.**—Functional activity is not restored. The exudate is largely absorbed and the pain disappears, and the patient feels well. But she is sterile—the sterility being due usually to remaining infiltration and adhesions that occlude the tubes and otherwise damage them.

3. **Chronic Pelvic Inflammation.**—A large percentage of the cases of acute pelvic inflammation terminate in chronic pelvic inflammation. There may be found a pelvic abscess, which requires opening and drainage by way of the vagina or removal by abdominal section. More frequently, however, there is a mass of exudate without a distinct collection of pus, but with a focus of chronic inflammation which acts as a source of constant irritation, causing pain on exertion and marked menstrual disturbance, and giving rise to frequent attacks of pelvic peritonitis.

4. **Death from Persistent Sepsis.**—The patient survives the acute symptoms at the beginning of the attack, but still there continues septic absorption or there develops general pyemia. There is irregular fever, with repeated chills if pyemia is present, emaciation, increasing weakness and finally death, two weeks to two months from the outset of the trouble.

This result is much more liable to take place where there is serious disease elsewhere—for example, in the kidneys or heart, or lungs or gastro-intestinal tract.

B. If the inflammation is so severe that the patient's life is threatened and immediate **operation** is required and carried out, the following are the terminations:

1. **Complete Recovery.**—Of the operative cases that survive the acute attack a large proportion is permanently cured. The patient's health may be fully restored and she is again capable of child-bearing.

2. **Partial Recovery.**—The exudate is absorbed, the pain disappear the patient has good health—but she remains sterile.

3. **Chronic Pelvic Inflammation.**—In the septic cases following lab miscarriage the troublesome postoperative lesions are usually adhesion plastic exudate. In the gonorrheal cases the other tube is very lia become inflamed and pass through the same process as the one remove vaginal drainage cases, whether septic or gonorrheal, the drainage trac close too soon, allowing the abscess to reform, or another focus may to abscess formation.

4. **Death in Spite of Operation.**—In many of these cases the inflamm is so virulent that no operation will stop its progress. On the other in some of the most threatening cases the patient's life is apparently by operation.

The prognosis in regard to **pregnancy** in patients who apparently re from acute pelvic inflammation, with or without operation, is as follows

1. If the previous inflammation was of the **ordinary septic** variety, is a fairly good chance of pregnancy later. Of course, such a patient i so liable to become pregnant as a perfectly healthy woman, and if she become pregnant she is more liable to miscarry. However, many w who have passed through one or more attacks of severe puerperal sepsis, involvement of tubes and peritoneum, recover apparently completely continue to bear children as though there had been no trouble.

2. If the previous inflammation was **gonorrheal,** involving the tube peritoneum, there is almost certain to be sterility. This is one of the c of sterility in prostitutes, and it is also a cause of many childless h The husband, having previously had gonorrhea and supposing himself married and unknowingly carried infection to his wife and thus dest her chance of becoming a mother. Fortunately, sterility does not inva follow gonorrheal salpingitis, some patients recovering sufficiently to be pregnant.

CHRONIC PELVIC INFLAMMATION

The inflammatory process may be situated principally in the fall tubes and pelvic peritoneum, or in the pelvic connective tissue, or in ovaries.

In chronic pelvic inflammation the separate forms of the disease are distinct than in the acute variety—that is, the cases may be divided distinct groups, representing the different localizations of the inflamm process and differing considerably in etiology, pathology and symptom ogy. The cases may be divided into three groups—(A) chronic salpin (with complicating oophoritis and chronic pelvic peritonitis, causing p neal exudate and adhesions), (B) chronic pelvic cellulitis (parametritis), (C) chronic oophoritis (cystic ovary).

(A) CHRONIC SALPINGITIS

Etiology

Chronic salpingitis follows acute salpingitis. In practically every case of genital origin there has been endometritis due to infection following labor, or miscarriage, or gonorrhea. Chronic pyosalpinx alone (without involvement of the parametrium) is nearly always due to the gonococcus, recognized or unrecognized—even in the cases in which the infection dates from a labor or miscarriage. The detailed proofs of this fact and the apparent exceptions will be discussed later, along with their bearing on the operative treatment of chronic inflammatory masses in the pelvis (see pages 851 to 867). From the endometrium the inflammation extends to the tube, causing first acute salpingitis and later chronic salpingitis.

The normal tubal lumen is practically filled with the folds of the normal mucous membrane, as seen in Figs. 728 and 730. In the inflamed tube these folds swell up, the covering epithelium becomes necrotic and the result is an agglutination of many of these folds (Figs. 746, 747). In the deeper layers of the mucosa by the fusing of the ends of the folds small cystic cavities are formed. The round-celled infiltration is pronounced and extends into the underlying muscular layer of the tube (Figs. 748 to 750).

Pathology

In chronic inflammation of the tube there is found much the same variety of pathologic changes as has been mentioned under acute inflammation. However, the serous exudate (whether in the cavity or in the tissues of the tube wall) has been largely absorbed, and all active infection is confined to one or more areas which are well surrounded by plastic exudate. Any collection of pus is well walled in, and in some cases is sterile from long standing. The adhesions, which at first were simply fibrinous exudate, are

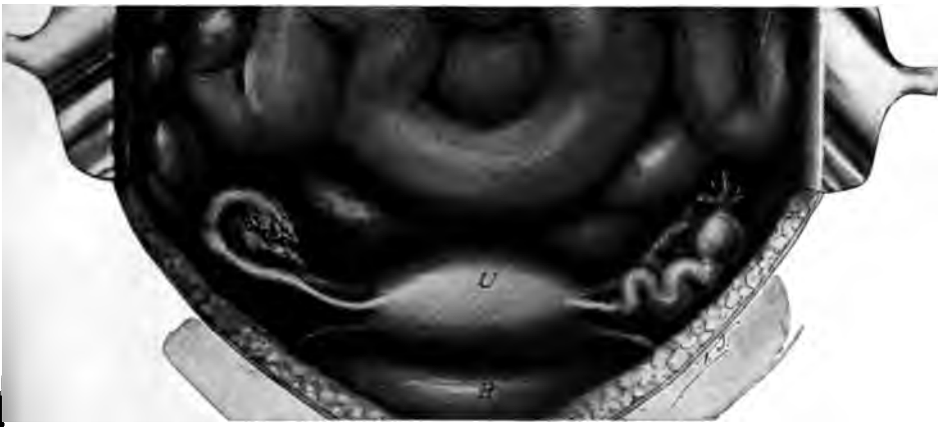


Fig. 743.—Mild salpingitis on the left side. Contrast this with the normal right tube. Notice the enlargement and tortuosity of the affected tube, and also the distortion of the fimbriae.

now organized and contain fibrous tissue and small vessels. Some of the adhesions now become stretched into long bands or attenuated cords, owing to the constant movement of the organs. The cases may be divided in classes as follows:

1. **Mild Salpingitis** (Fig. 743).—In the cases of this class the ends of the affected tube are occluded and the fimbriae matted together and distorted, and frequently adherent to the ovary or some other adjacent organ. The wall of the tube is thickened and the cavity is empty.

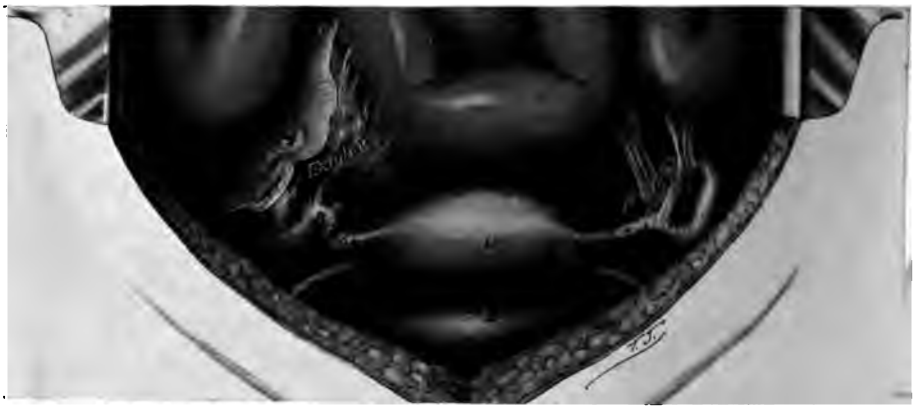


Fig. 744.—Salpingitis with exudate. On left side is indicated salpingitis with a few adhesions. On right side is indicated salpingitis with extensive exudate and adhesions. The section indicates the relation of the thickened tube, the ovary, and the surrounding exudate.

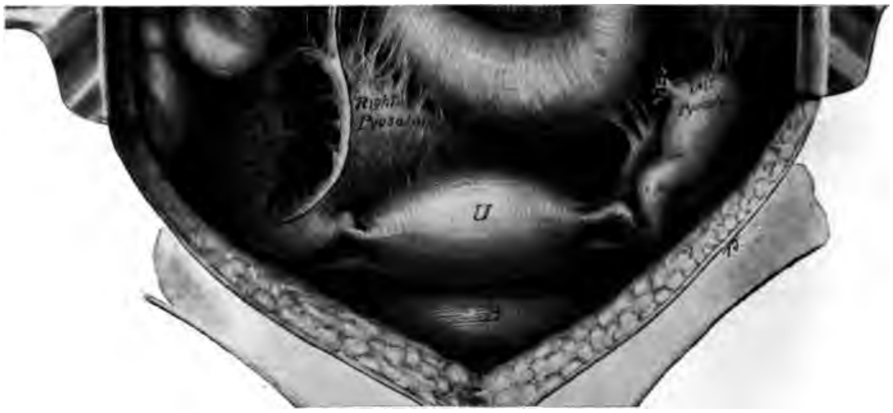


Fig. 745.—Pyosalpinx. Left tube distended with pus, but with few adhesions. Right tube distended, with pus and surrounded by extensive adhesions. The section on the right side indicates the relation of the distended tube to the surrounding structures. The sectioned ovary is indicated dimly below and to the outer side of the enlarged tube, which has fallen behind and to the inner side of it.

2. **Salpingitis with Exudate** (Fig. 744).—In the cases of this class there is a mass of exudate about the tube, binding together the adjacent organs, but there is no distinct collection of pus.

3. **Pyosalpinx** (Figs. 745, 751 to 757).—The occluded tube contains pus. There may or may not be extensive exudate and adhesions. There is no pus outside the tube.

4. **Diffuse Pelvic Suppuration** (Figs. 758, 759).—In the cases of this class

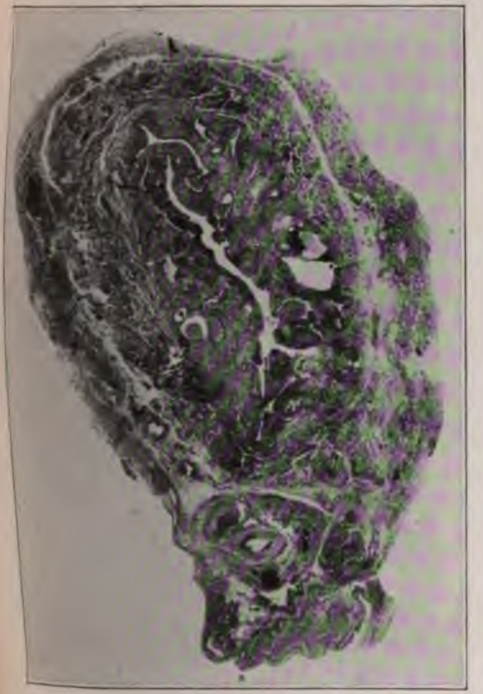


Fig. 746.—Chronic salpingitis. Cross section of tube. Gyn. Lab.

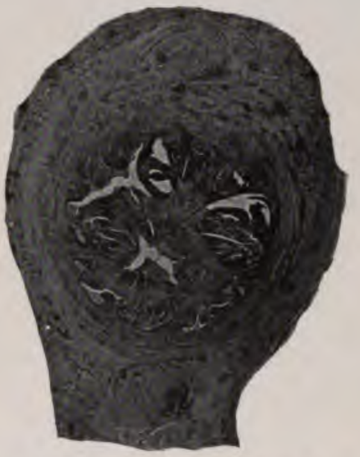


Fig. 747.—Chronic salpingitis. Cross section of tube. Notice the agglutination of the folds and total disorganization of the tubal interior in this and the preceding specimen. Compare these photomicrographs with Figs. 729 and 730. Gyn. Lab.

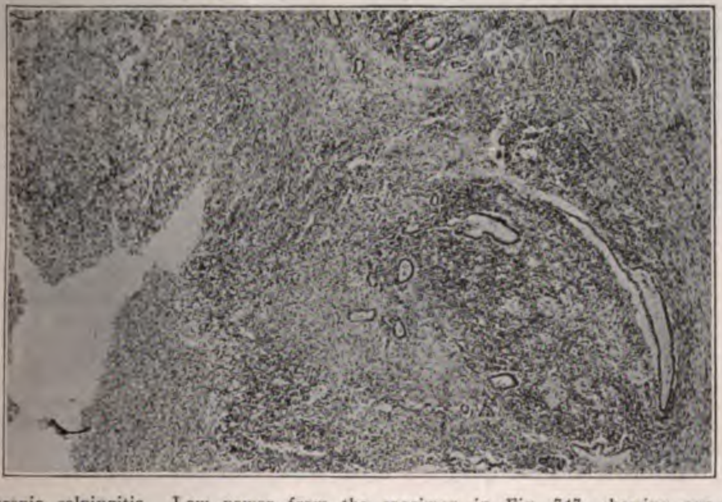


Fig. 748.—Chronic salpingitis. Low power from the specimen in Fig. 747, showing pus in the tube lumen (at left), marked inflammatory infiltration and destruction of folds. Gyn. Lab.

the pus has extended outside the tube. As the pus extends in various directions, the exudate extends in front of it, shutting it off from the general peritoneal cavity. As in acute inflammation, this process may extend until all the pelvic organs are bound together in an irregular mass, with pus lying in the spaces between them.

5. **Ovarian Abscess** Fig. 757).—The inflammation may extend to the ovary, forming an ovarian abscess in communication with a tubal abscess (Fig. 757, right side). More rarely there is a distinct ovarian abscess without evident pus formation in the tube (Fig. 757, left side).

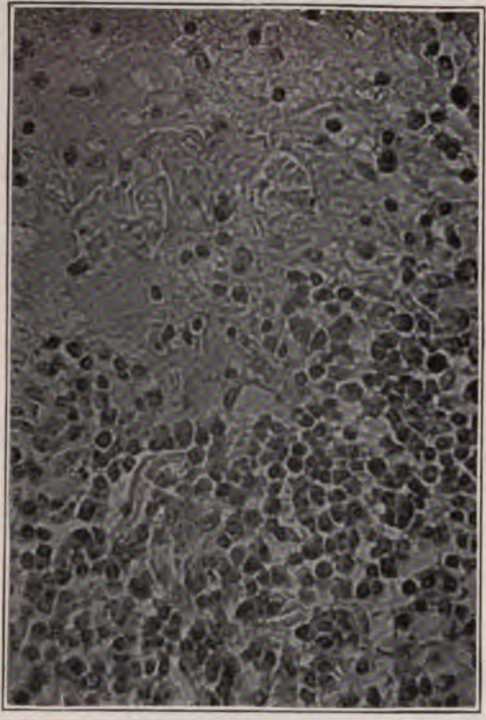


Fig. 749.—Chronic salpingitis, high power from Fig. 748, showing the cells of the inflammatory infiltration. Most of these are plasma cells. Gyn. Lab.

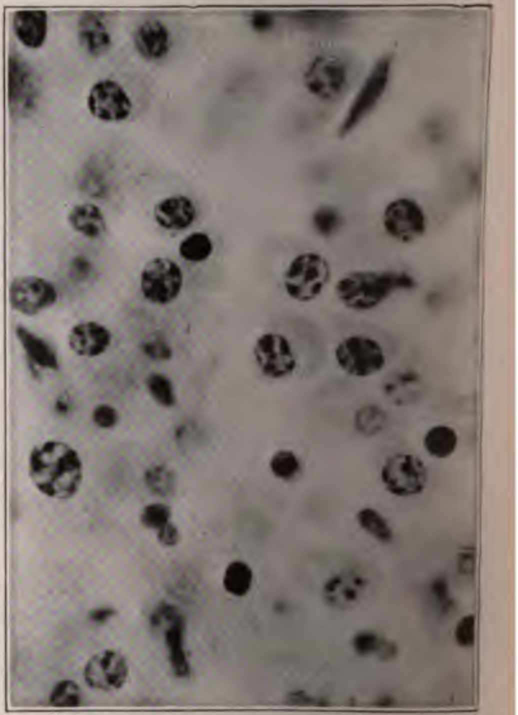


Fig. 750.—Chronic salpingitis, very high power from Fig. 749, showing details of the plasma cells, especially the characteristic fragmented nucleus eccentrically placed. Gyn. Lab.

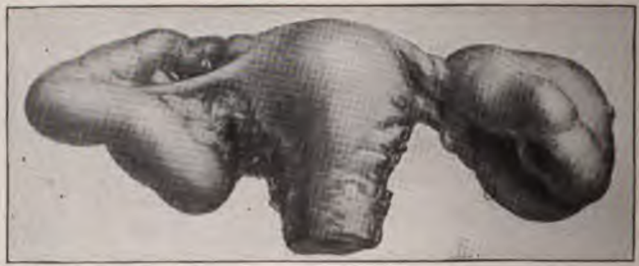


Fig. 751.—Pyosalpinx with no adhesions. (Kelly—*Operative Gynecology*.)

6. **Hydrosalpinx** (Fig. 760).—The tube may be much distended and contains serous fluid, but no pus. As the result of the pressure of the fluid within the closed tube the largest part of the mucous lining is destroyed (Fig. 761). Only here and there a preserved typical fold can be seen (Fig. 762). There may or may not be many adhesions,

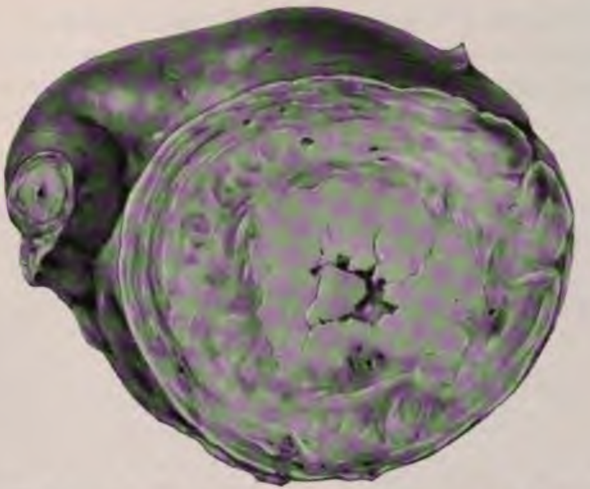


Fig. 752.—Section through a pyosalpinx, contrasting the fairly normal uterine end of the tube (to the left) with the distended portion. The pus in the tube has been hardened by preservation of the specimen in formalin. Gyn. Lab.

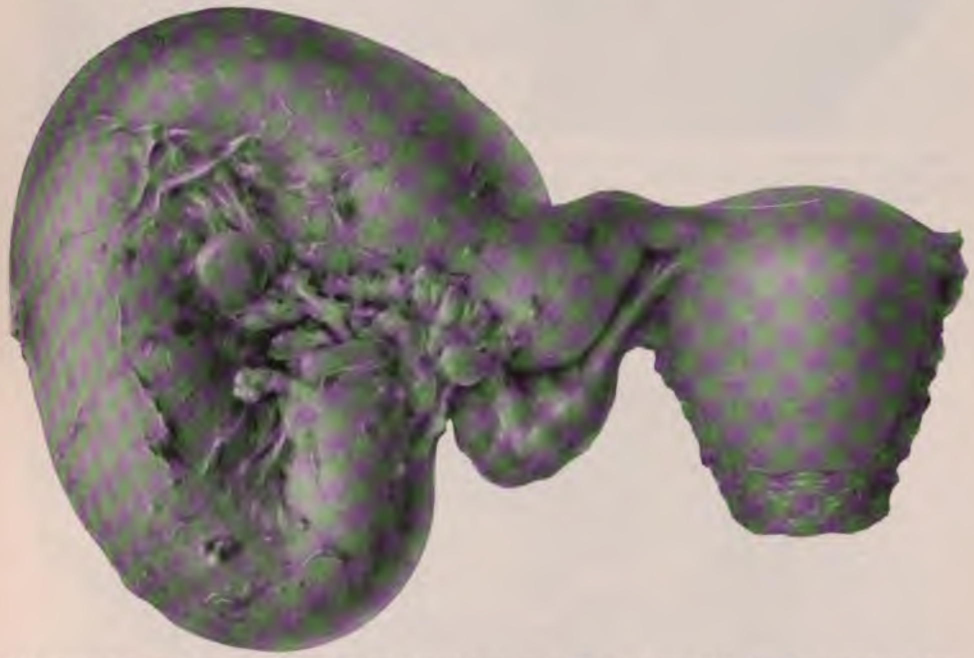


Fig. 753.—A very large pyosalpinx, removed intact together with the uterus. The specimen is shown from the back and shows the tortuous appearance of the greatly distended left tube. Gyn. Lab.

7. **Nodular Salpingitis** (Figs. 763 to 765).—The wall of the tube becomes greatly thickened, the thickening being so irregular as to give the tube a distinctly nodular appearance. Usually both tubes are affected, and frequently there is also chronic oophoritis of one or both sides.

8. **Adhesions** (Fig. 766).—There is a class of cases of chronic salpingitis in which the tubal trouble is slight or has largely disappeared, but the resulting peritoneal adhesions are extensive and troublesome, dislocating the tubes

and ovaries and holding them firmly in abnormal positions. **In such cases** all active infection may have disappeared, leaving only the sequelae, consisting of exudate, adhesions, and distortions.

Symptoms

The symptoms of which the patient complains in **chronic pelvic inflammation** are **backache** and **pain in the pelvis,** increased by walking or working. There is **tenderness** in the lower abdomen, usually over one or both tubes. There are decided **menstrual disturbances,** consisting of painful menstruation, prolonged menstruation and an increase of all the troublesome symptoms at the menstrual periods. The patient complains of **weakness** and loss of weight,

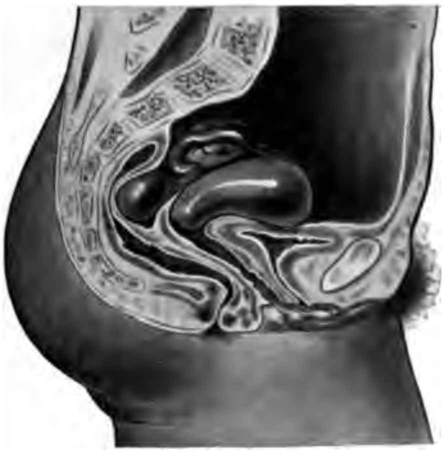


Fig. 754.—Thickened tube and ovary prolapsed into the culdesac behind the uterus. (Montgomery—*Practical Gynecology.*)

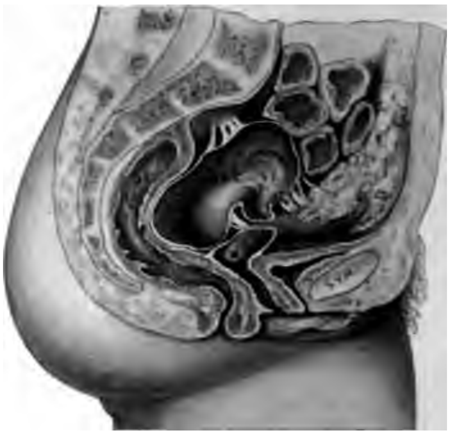


Fig. 755.—An abscess behind the uterus. (Montgomery—*Practical Gynecology.*)

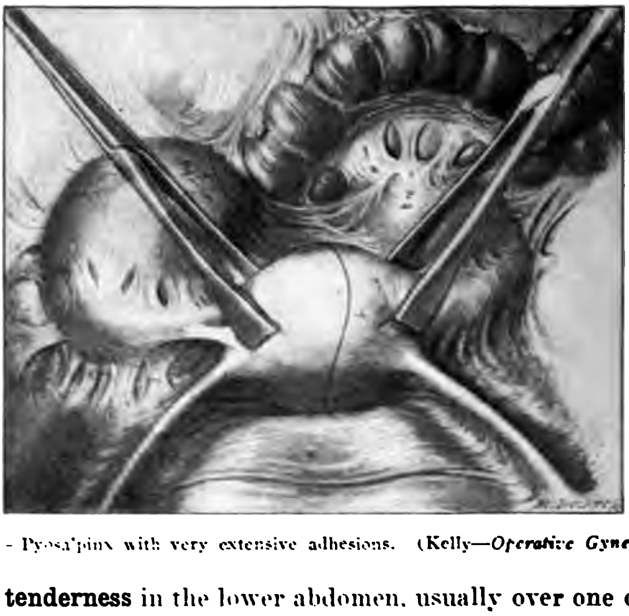


Fig. 756.—Pyosalpinx with very extensive adhesions. (Kelly—*Operative Gynecology.*)

and an inability to stand walking or working as she formerly did. **Vaginal discharge** is usually present, due to the accompanying endometritis. There occur also **exacerbations,** in which the patient has sharp pain and some fever, and is sick in bed from a few days to several weeks.

On examination there is found **tenderness** in the tubal region of one or both sides and in most cases **a mass** in the same region. If the inflammation is slight, there may be no mass of exudate, but simply a thickening of the affected tube. If the inflammation is more marked, there is a distinct mass

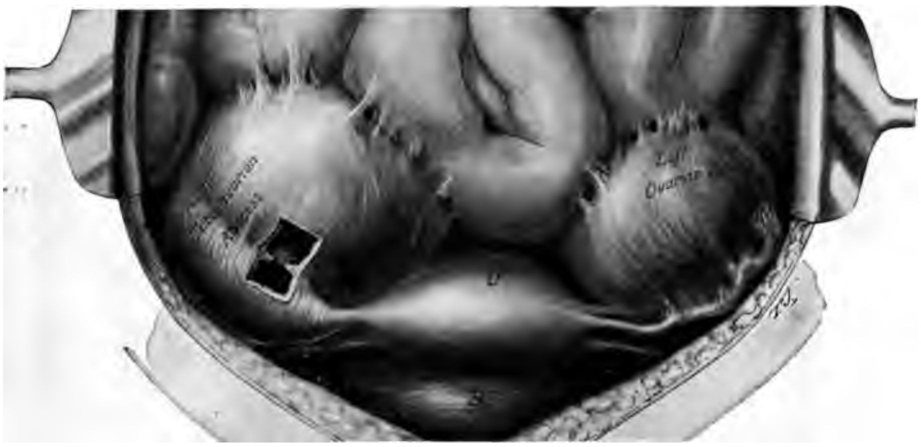


Fig. 757.—Ovarian abscess. A window, cut in the wall of the abscess on the right side, shows that it is composed of a tubal portion and an ovarian portion (tubo-ovarian abscess), with a communication between the two cavities. On the left side is indicated an abscess involving the ovary only, which is a much rarer condition.

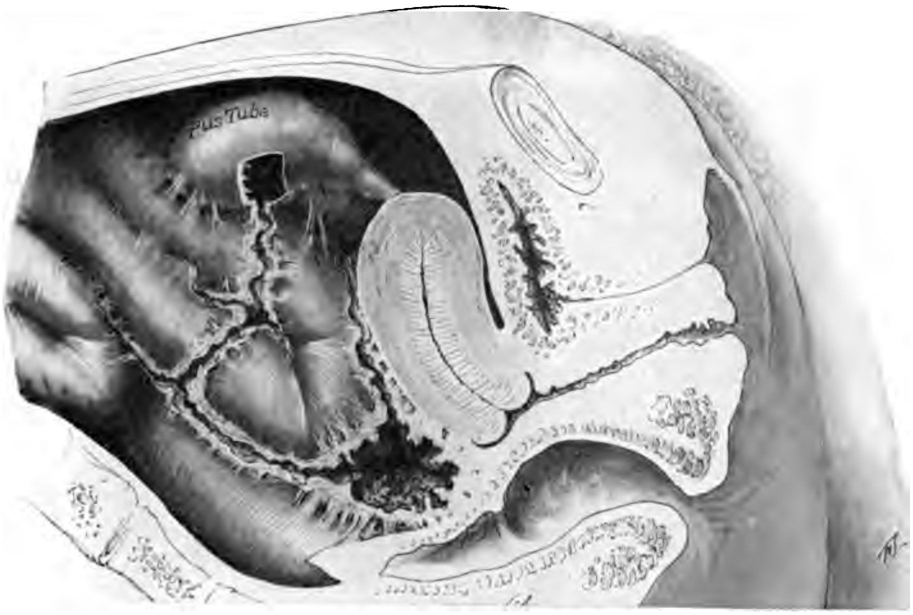


Fig. 758.—Diffuse pelvic suppuration from pyosalpinx. The pus has broken through the tube wall, spread among the intestinal coils and gravitated to the culdesac. A window, cut in the distended tube, shows the connection of the suppurating tract with the tubal cavity.

beside the uterus in the tubal region, fixing the uterus to the pelvic wall. If the inflammation is still more marked, the posterior culdesac contains a mass of exudate, or the whole pelvis may be filled with a mass, which forms a wall above the place of the vagina (Figs. 377, 378), and the uterus is fixed immovably in this roof of exudate. The exudate is tender when pressed upon and, if there is a large **collection of pus,** fluctuation may be felt in the culdesac of Douglas or in the tubal region of one side. The uterus is fixed, and attempts to move it cause pain. The amount of **fixation** or limitation of movement depends, of course, on the extent of the exudate and adhesions.

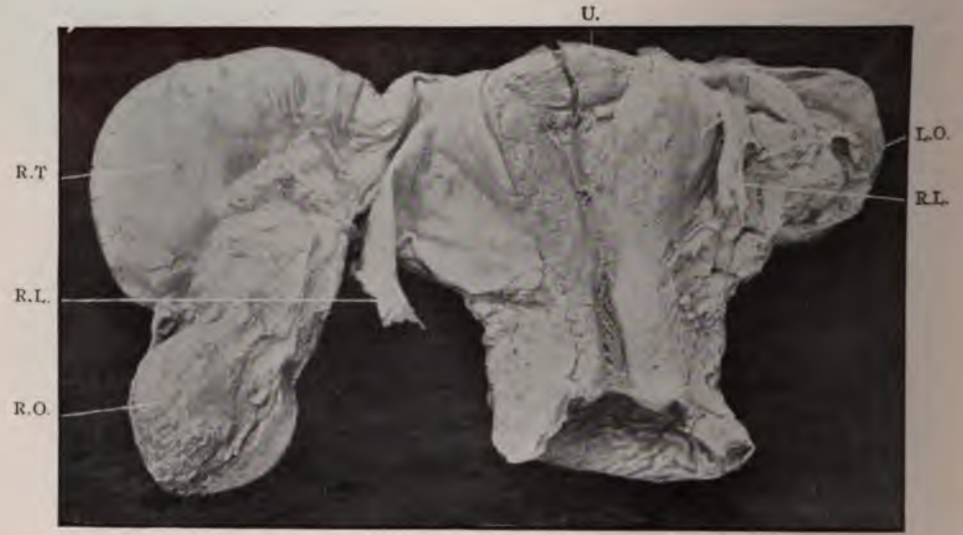


Fig. 759.—Chronic salpingitis with adhesions, showing the matting together of the pelvic structures that takes place in many of these cases. *U,* Uterus split open. *RT,* Right tube, distended with fluid (hydrosalpinx). *RL,* Round ligaments. *RO,* Right ovary. (Keating and Coe—*Clinical Gynecology.*)

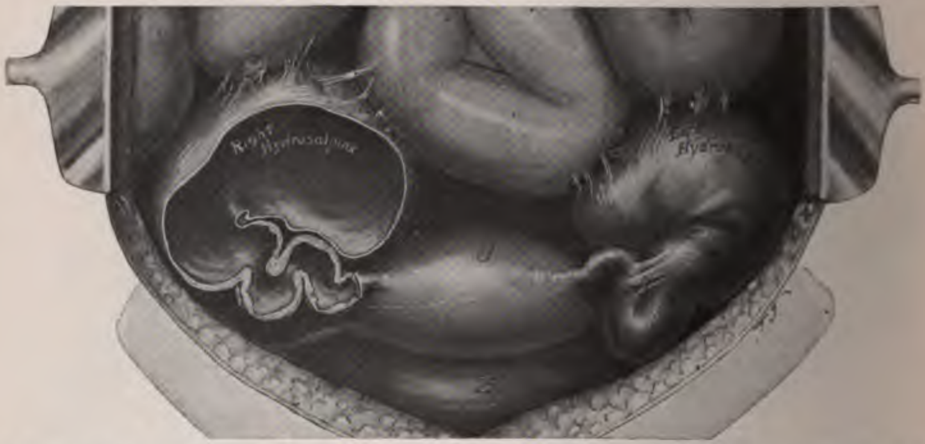


Fig. 760.—Double hydrosalpinx. The sectioned right tube indicates clearly the marked thinning of the wall found in these cases.

The cases of chronic salpingitis frequently present also complications—

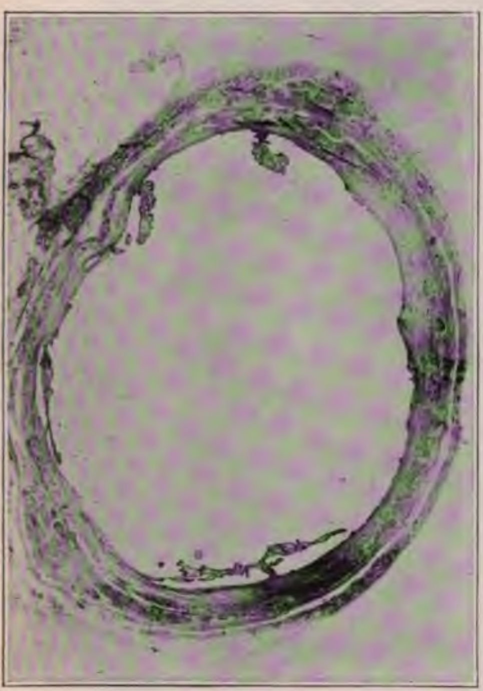


Fig. 761.—Hydrosalpinx. Notice how the pressure of the fluid destroys the mucosal folds, leaving only a few remnants. Gyn. Lab.

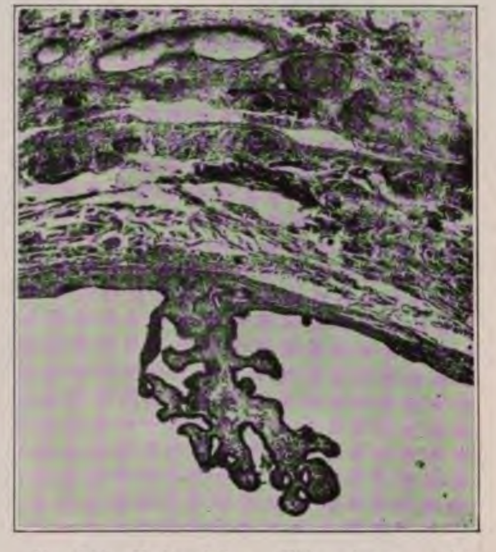


Fig. 762.—Hydrosalpinx. This shows, under higher power, the small fold-remnant at the top in Fig. 761. Gyn. Lab.

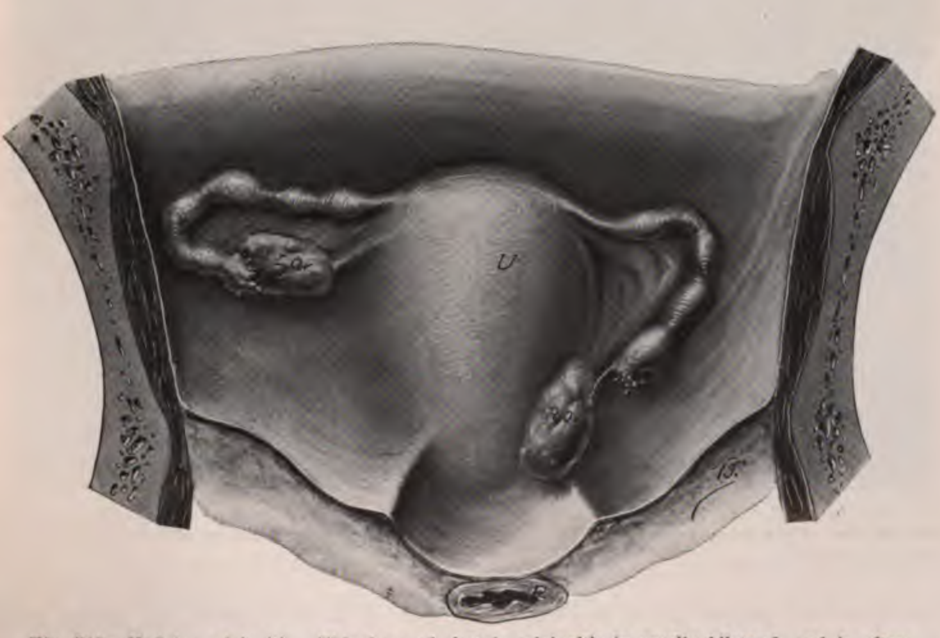


Fig. 763.—Nodular salpingitis. This form of chronic salpingitis is usually bilateral, and is often accompanied by prolapse of the tube or ovary on one or both sides.

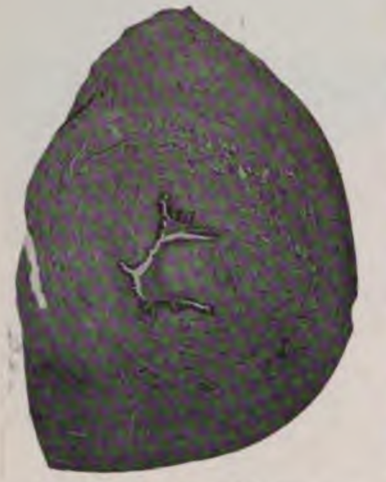


Fig. 764.—Nodular salpingitis, cross section. Shows a markedly thickened tube. The thickness is due entirely to chronic inflammation and fibrous tissue formation in the wall. The lining epithelium is intact—see Fig. 765. Gyn. Lab.

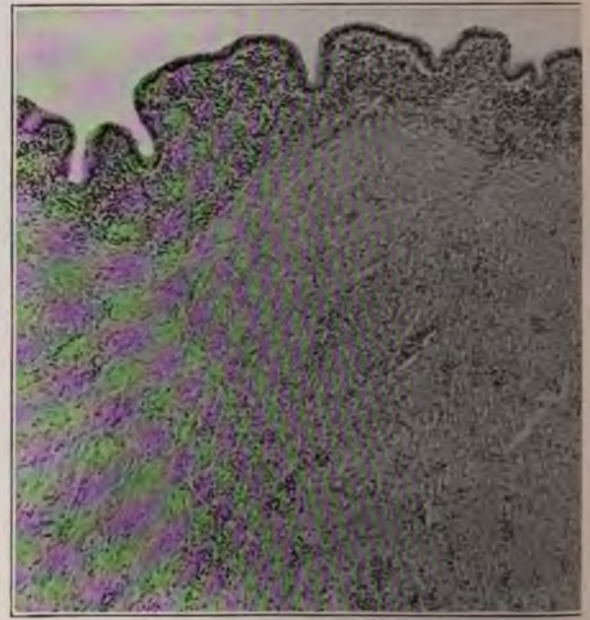


Fig. 765.—Nodular salpingitis. High power of Fig. 764. Notice inflammatory infiltration of the wall and the intact epithelial lining of the cavity. Gyn. Lab.

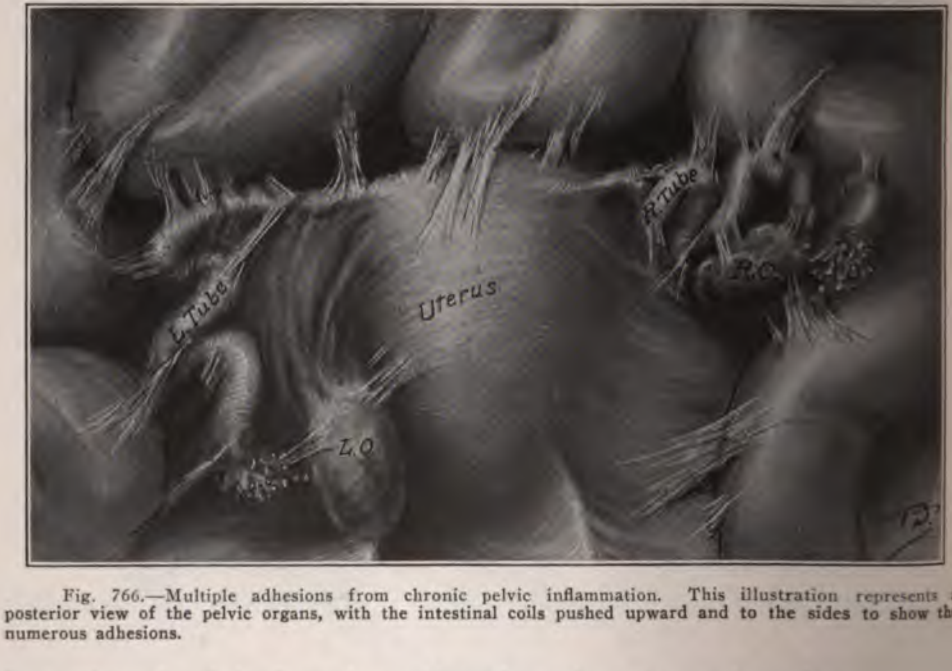


Fig. 766.—Multiple adhesions from chronic pelvic inflammation. This illustration represents a posterior view of the pelvic organs, with the intestinal coils pushed upward and to the sides to show the numerous adhesions.

laceration of pelvic floor, laceration of cervix, retroversion of u chronic endometritis. These conditions should be searched for aı they must be taken into consideration in the treatment.

(B) CHRONIC PELVIC CELLULITIS (PARAMETRITIS)

Parametritis is chronic inflammation of the connective tissue surrounding the uterus. There is usually more or less secondary infiltration of the connective tissue in all extensive pelvic inflammations, and sometimes pus of tubal origin will make its way into the connective tissue. But most of the cases of well-marked cellulitis are due to extension of infection directly from the uterus into this region.

Etiology

Chronic cellulitis is due to a preceding acute cellulitis and consequently has the same causative factors. It is usually due to infection following labor or miscarriage, the bacteria passing directly through the wall of the uterus into the connective tissue or through tears of the cervix. In other cases it can be traced to operation on the cervix, to operation within the uterus, to instrumental examination of the interior of the uterus, or to attempts at abortion. Cellulitis alone (without tubal involvement) is usually due to the streptococcus, staphylococcus or colon bacillus—practically never to the gonococcus. This point is further discussed under the subject of the operative treatment of these masses.

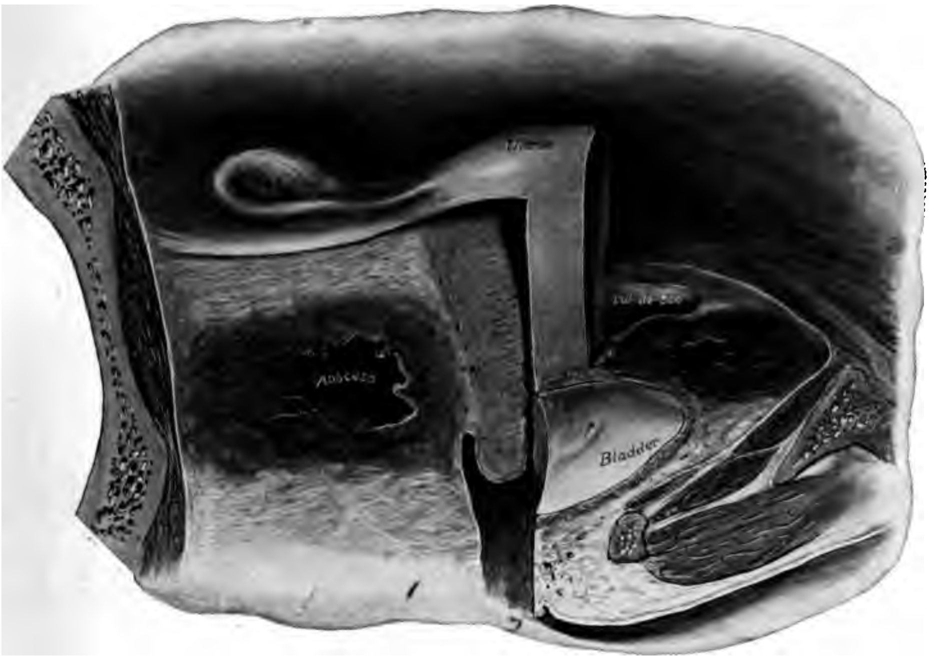


Fig. 767.—Pelvic cellulitis (parametritis). The broad ligament inflammatory mass is represented as sectioned longitudinally on the right side and transversely on the left side. The former (right side of pelvis) indicates how the infiltration extends down along the cervix and vaginal wall, and the latter (left side of pelvis) indicates how it extends forward to the bladder and backward to the peritoneal culdesac, causing a convexity toward the cavity of the culdesac.

Pathology

Pelvic cellulitis, like inflammation of connective tissue elsewhere, is essentially an acute or subacute lymphangitis, running its course and ending in resolution or abscess formation, or a mass of unabsorbed exudate and infiltration, which may or may not conceal a focus of pus in its interior. Occasionally the infection will progress through the wall of the uterus as a thrombophlebitis and later break through the broad ligament veins into the connective tissue. The condition in any particular case may vary from a small area of induration on one side of the cervix to extensive induration, involving the connective tissue all around the uterus and extending out to the pelvic wall on each side (Fig. 767). The process may extend forward into the connective tissue beside the bladder, or backward along the sacro-uterine ligaments. Fig. 768 shows various situations in which the mass may be found.

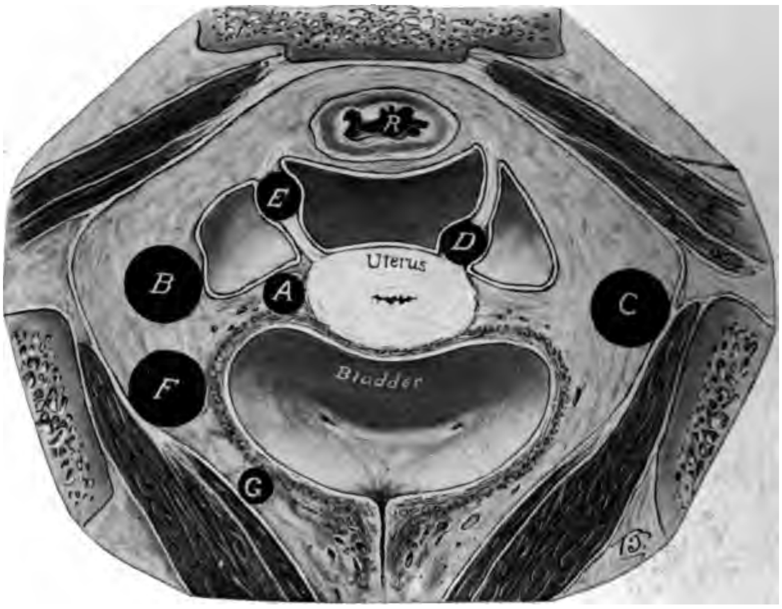


Fig. 768.—Indicating the various situations in which a parametritic mass may be found. *A*, close to the side of the cervix; *B*, at the middle of the broad ligament; *C*, at the outer portion of the broad ligament; *D*, in the sacrouterine ligament close to the cervix; *E*, in the posterior portion of the sacrouterine ligament; *F*, at the side of the bladder; *G*, in the anterior portion of the pelvis.

Symptoms

The **symptoms** are much the same as those due to salpingitis—namely, backache, pain in the lower abdomen, tenderness in pelvis, and menstrual disturbances. The severe exacerbations, so characteristic of salpingitis, are not present usually in cellulitis, unless there is complicating salpingitis.

On examination, **induration of extreme hardness** is felt very low in the pelvis and closely attached to the sides of the cervix—the portion of the uterus in contact with the connective tissue (Fig. 767). The marked induration may extend out to the pelvic wall, and may be so intimately attached to the bone and so hard as to appear to be a bony or cartilaginous outgrowth from the wall of the pelvis. In some cases in which it is difficult to determine certainly whether the induration is in the connective tissue or about the tube, the history of the trouble—its cause and subsequent course—will help in distinguishing between the two.

(C) CHRONIC OOPHORITIS

Chronic inflammation of the ovary may be secondary or primary. Secondary inflammation of the ovary is due, as a rule, to extension from a salpingitis. The inflammation about the outer end of the tube involves the adjacent peritoneum and ovary. When this takes place the following conditions in the ovary may result:

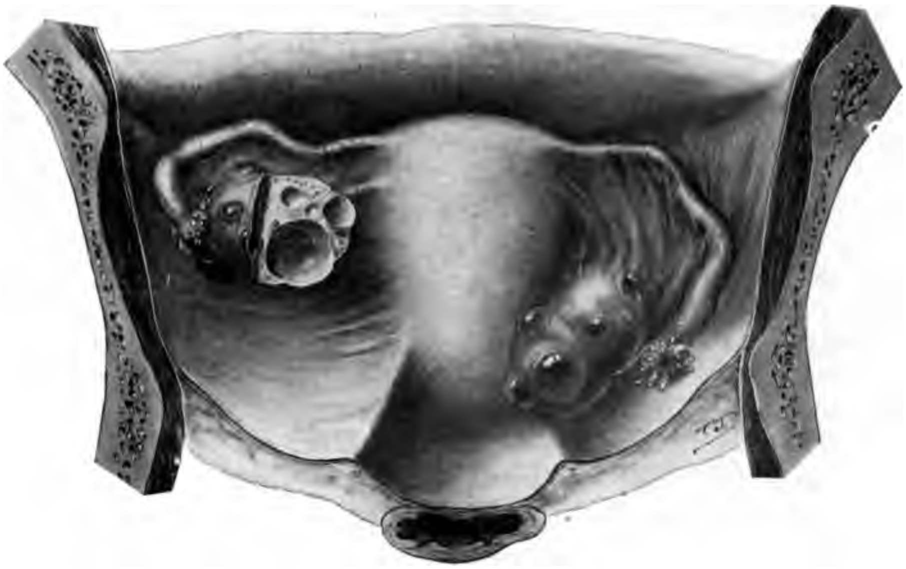


Fig. 769.—Cystic ovary. This affection is usually bilateral, and the chronically inflamed and heavy ovary is often prolapsed.

1. One or more points of infection, with inflammation, infiltration and swelling—the inflammation involving both the follicles and the interfollicular connective tissue. It may or may not progress to the stage of abscess formation. When an ovarian abscess forms, it is usually in connection with tubal suppuration, hence it was considered along with salpingitis.

2. The ovary, instead of becoming infected, may simply become surrounded by exudate, which compresses it, damaging it and causing cellular infiltration of the connective tissue (both the capsule and stroma). In time this round-celled infiltration forms scar-tissue, and as it contracts it further interferes with the graafian follicles, so that they atrophy or form small cysts. From this process the functionating part of the ovary becomes reduced in size, and the organ may come to consist simply of a mass of fibrous tissue with small cysts scattered through it. This condition is called cirrhosis, and ovaries thus affected are designated as "cirrhotic ovaries."

Primary inflammation of the ovary is due to infection carried by the blood or to active hyperemia (from excessive sexual excitement or suppression of menses), or to interference with the circulation (from malposition, or from chronic inflammation of the uterus or tubes, or from a tumor of the uterus, or from other pelvic tumor). In the case of infection the inflammation runs the same course as in oophoritis, secondary to salpingitis.

In the case of oophoritis due to circulatory disturbance without infection, the process is really not inflammation, but a nutritive disturbance accompanied with chronic irritation. There is chronic congestion of the ovary, round-celled infiltration and enlargement, with dilatation of the graafian follicles. This produces a large, heavy, tender "cystic ovary" (Fig. 769). The heavy ovary is very liable to sink down back of the uterus, low in the pelvis, a condition known as "prolapse of the ovary." Later, owing to the contraction of the newly-formed connective tissue, the ovary may shrink and become cirrhotic.

The normal changes in the ovary, incident to the rupture of the graafian follicles and subsequent scar formation (see Chapter XII), produce appearances which are sometimes mistaken for inflammation.

The **symptoms** of infective inflammation of the ovary are about the same as those of salpingitis. In the noninfective inflammatory disturbances above referred to (hyperplasia of ovary, cystic ovary, cirrhotic ovary, prolapse of ovary) the symptoms are much the same as in a chronic salpingitis, but without the severe exacerbations, confining the patient to bed for one or two weeks. The symptoms approach those of a neuralgic rather than an inflammatory character. The patient is rarely, if ever, confined to bed more than a few hours, except in some cases at the menstrual periods. Examination shows no mass of exudate about the tube, but one or both ovaries are enlarged and very tender, and possibly prolapsed. In a later stage the enlarged ovary may shrink and become smaller than normal (cirrhotic ovary).

DIFFERENTIAL DIAGNOSIS OF CHRONIC PELVIC INFLAMMATION

The diseases which may be confounded with chronic pelvic inflammation, and which therefore must be taken into consideration in the differential diagnosis, are as follows:

Chronic endometritis.
Myoma of the uterus.
Tubal pregnancy, with chronic symptoms.
Tuberculosis of the tubes and peritoneum.
Syphilis of the pelvic structures.
Ovarian and broad ligament tumors.
Chronic appendicitis.
Mucous colitis.
Bladder and rectal affections.
Pelvic neuralgia.
Neurasthenia.
Hysteria.

In **chronic endometritis,** without pelvic inflammation, the trouble is confined to the uterus, and consequently there is no marked tenderness nor any inflammatory mass outside the uterus.

A **myoma** of the uterus usually presents the following points:

a. The symptoms are of gradual onset, and consist principally of menstrual disturbances, particularly increased flow.

b. Absence of fever and absence of attacks of pelvic peritonitis.

c. The mass is hard, has a definite and rounded outline, is intimately connected with the uterus and not attached to the pelvic wall.

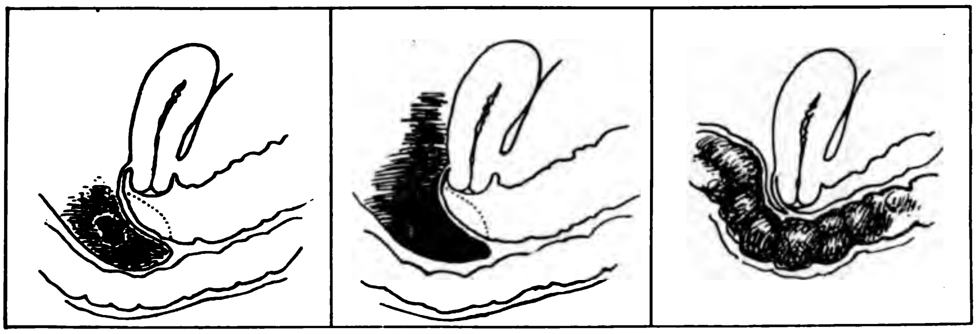


Fig. 770.—Differential diagnosis of pelvic inflammation. A mass low behind cervix. *A*, Inflammatory mass filling culdesac. *B*, Blood filling culdesac. *C*, Fecal mass distending rectum back of cervix.

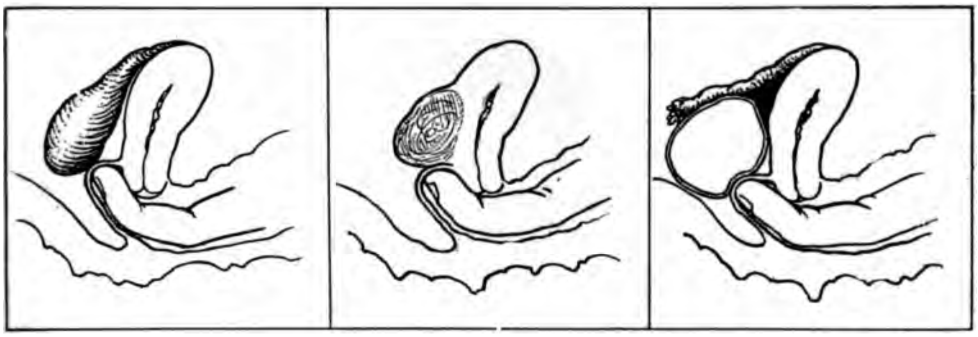


Fig. 771.—Differential diagnosis of pelvic inflammation. A rounded mass rather high in culdesac. *A*, Tubal mass. *B*, Small myoma on posterior wall of uterus. *C*, Small ovarian cyst.

d. There is not the marked tenderness that is found in pelvic inflammation.

e. There is no fixation unless the tumor is large enough to impinge on the pelvic wall. The uterus and tumor are movable together, but not separately.

f. If necessary to sound the uterus, it will usually be found increased in depth.

Ovarian and **Broad Ligament Tumors** present the following characteristics:

a. Gradual onset of symptoms.

b. Absence of fever and of marked menstrual disturbance and of severe attacks of pelvic peritonitis.

c. Large tumor mass without particular tenderness and without fixation. In the case of an ovarian tumor the mass can usually be moved about in the lower abdomen.

d. Distinct fluctuation without marked tenderness, indicating that the fluid is not pus.

Tuberculosis of tubes and peritoneum. The distinguishing characteristics of tuberculosis of the tubes and peritoneum are:

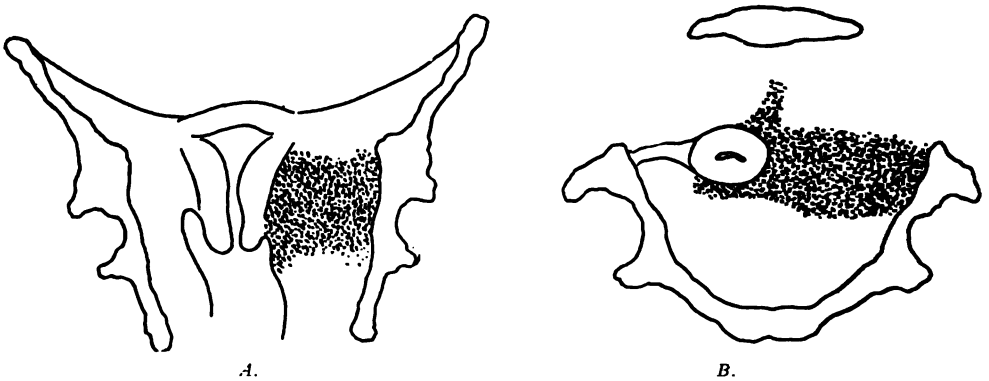


Fig. 772.—Differential diagnosis of pelvic inflammation. Solid exudate in the broad ligament. Notice how the exudate follows the outlines of the adjacent organs and becomes incorporated with them. *A*, Vertical side to side section. *B*, Horizontal section.

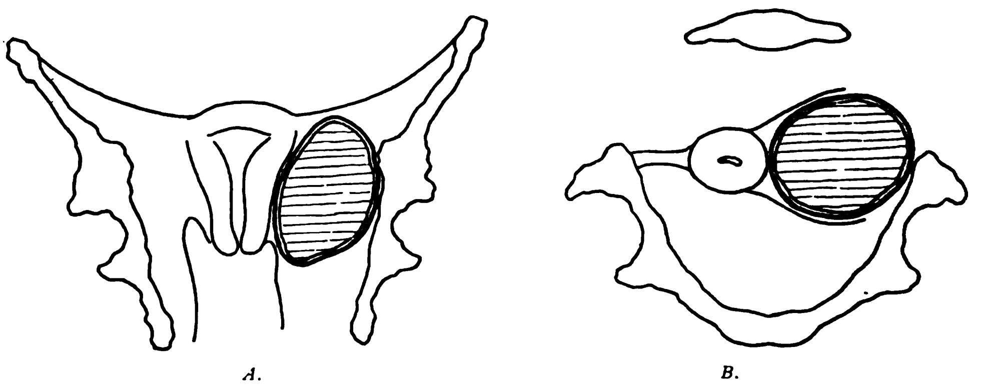


Fig. 773.—Differential diagnosis of pelvic inflammation. Cystic tumor in the broad ligament. This mass presents to the examining finger a distinct rounded outline of its own. Compare with the inflammation exudate in Fig. 772.

a. Decided symptoms of pelvic inflammation in a young woman who has had no opportunity to contract pelvic inflammation—that is, in a woman who has never had endometritis.

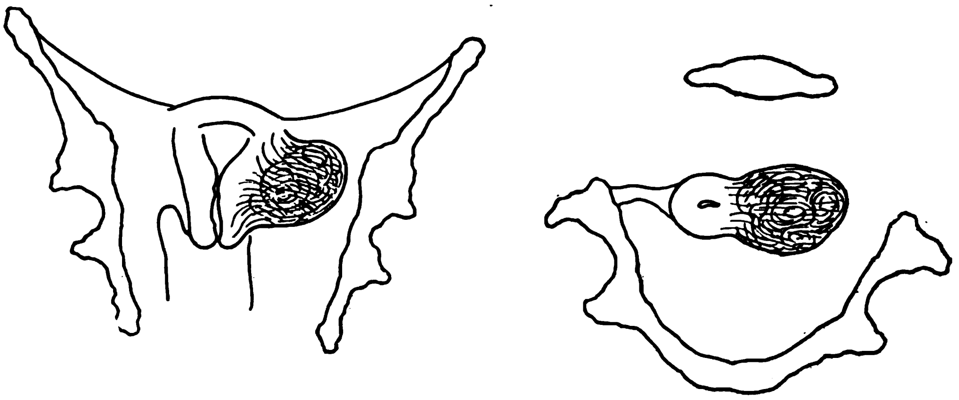
b. Gradual onset, usually, and persistent progress without the marked improvement usually following the treatment of ordinary pelvic inflammation.

c. Encysted ascites—a collection of fluid shut off from the general peritoneal cavity by adhesions—without the marked pain and fever that would come with a collection of pus.

d. Evidence of tuberculosis elsewhere.

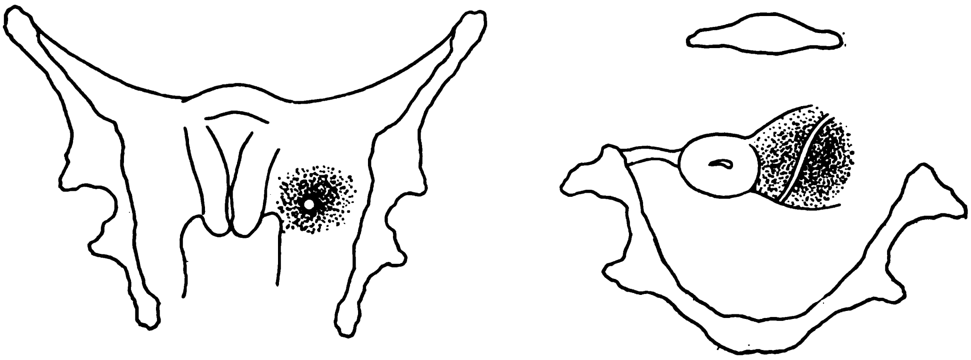
e. Emaciation, gradual, but marked and persistent—more so than would be accounted for by the pain, fever, etc.

Syphilis of the tubes and peritoneum sufficient to cause symptoms is rare, but it should always be borne in mind in patients presenting marked evidence of syphilis especially if there is severe ulceration of the genitals or rectum or if there is stricture of rectum. All such patients presenting symptoms of chronic pelvic inflammation should be given a thorough course of potassium iodide before operation is decided upon.



A. *B.*

Fig. 774.—Differential diagnosis of pelvic inflammation. Myoma projecting from the uterus into the broad ligament. This solid tumor presents to the examining finger a distinct rounded outline of its own, very different from the inflammatory exudate represented in Fig. 772.



A. *B.*

Fig. 775.—Differential diagnosis of pelvic inflammation. Inflammatory exudate about the ureter.

It is the cellular deposit of the tertiary stage that attacks these structures.

a. Evidence of syphilis elsewhere in the body.

The symptoms pointing to such trouble are:

b. Gradual onset of the trouble, usually in connection with some other active evidence of syphilis in the third stage.

c. The reactions for syphilis (Wassermann, Noguchi) are positive. Spirochetes have never been seen in tubes.

Though this syphilitic condition in the pelvis is rare, it occasionally occurs and must be watched for in syphilitics.

Chronic Appendicitis may be difficult to differentiate from chronic salpingitis of the right side. The facts pointing to appendicitis are as follows:

a. High location of the painful area, at McBurney's point, without a painful area at the site of the fallopian tube.

b. Stomach and intestinal disturbance, preceding and accompanying an attack. Also pain in the region of the umbilicus, rather than in the back.

c. High location of the mass of exudate—not felt so well from vagina as would be a mass about the fallopian tube.

d. Absence of endometritis and absence of a history of previous uterine sepsis or gonorrhea.

e. No marked increase of the trouble at the menstrual periods. Even appendicitis may show some increase then, but it is not so marked as in salpingitis.

In a case of inflammation in the right lower abdomen in a girl, or in a woman who has never been pregnant nor had any uterine infection, the trouble is more likely to be appendicitis. On the other hand, in a case of inflammation in that locality in a woman who has once had infection of the uterus, the probability is in favor of salpingitis. In some cases it is impossible to make a positive differential diagnosis until the abdomen is opened. In fact, it not infrequently happens that both structures are involved in the inflammatory process, the inflammation beginning in the tube and extending to the appendix or beginning in the appendix and extending to the tube.

Other **intestinal diseases** also must be excluded. Mucous colitis is the one which has most frequently been mistaken for chronic tubal or ovarian inflammation. The points that distinguish mucous colitis from chronic pelvic inflammation are (a) the character of the pain (resembling intestinal cramps and extending throughout the lower abdomen), (b) the passage of characteristic masses of mucus in some of the attacks and (c) the absence of any palpable pelvic lesion.

There are also disease of the **urinary organs** that may be confounded with chronic pelvic inflammation. All these affections must be excluded by a knowledge of the symptoms and signs that accompany them.

In **pelvic neuralgia** and in neurasthenia and in hysteria, without complicating pelvic inflammation, there is no abnormal mass within the pelvis. In pelvic neuralgia the tenderness may be localized along the pelvic nerve trunks (see Fig. 126). Certain conditions in the posterior culdesac area that must be differentiated in examination are indicated in Figs. 770 and 771. Masses occurring in the broad ligament area are indicated in Figs. 772 to 775.

Treatment

In the treatment of chronic pelvic inflammation (chronic salpingitis, chronic oophoritis, chronic pelvic peritonitis, chronic pelvic cellulitis, and all combinations of these lesions) there are certain general measures that are applicable to practically all cases, and there are also special measures that are applicable to special conditions only.

GENERAL MEASURES

1. **Laxatives** as needed to overcome chronic constipation. Cascara sagrada is an excellent laxative for this purpose after the bowels have been thoroughly moved by some more active purgative. Use the laxative pills containing aloin, belladonna, strychnia and cascara, one pill each night or one each night and morning. For continued use the mineral oils (paraffine oil) prove most suitable.

2. **Attention** to the **general health**, as indicated by anemia, lithemia or other abnormal condition. This is particularly important in chronic pelvic diseases if satisfactory results from treatment would be secured. Just because the patient has some pelvic disease, do not jump at the conclusion that treatment of that alone will cure her. There may be an affection in some other part of the body that has far more to do with the patient's ill health; and even considering the effect on the pelvic affection only, the general health should be built up as much as possible.

3. **Rest** at the menstrual periods. If the patient suffers much, she should go to bed and have hot applications made to the lower abdomen. If this does not give relief, she should be given sedatives as necessary, but opium should be avoided.

4. **Hot Vaginal Douches,** one to three times daily. To secure the best result, these must be given according to the special directions detailed in Chapter III.

5. **Applications** to the **vaginal vault.** Ichthyol (10 per cent) in glycerine and applied by means of tampons every second or third day, aids some in relieving the pain and hastening the absorption of the exudate.

6. **Applications** to the **lower abdomen.** The most effective application to the lower abdomen is the *hot-air* chamber for the systematic application of dry heat. This method, long used in other parts of the body in the treatment of chronic inflammation, has proved helpful also in like lesions in the pelvis. Various forms of apparatus are available for the purpose. Gellhorn devised a convenient one for use where electricity is available and gave a résumé of the subject (Am. Jour. Obst. and Gynec., July, 1909). In a personal communication he gives the following condensed description of the method:

"A very simple hot-air chamber which is particularly suited for gynecological purposes is a semicircular cradle made of a sheet of aluminum and lined with asbestos. On the inside of the free edges eight electric light bulbs are attached and a long wire furnishes the connection with the nearest switch (Fig. 776).

"The apparatus is placed over the lower abdomen which is left bare, but the iliac bones and the upper portions of the thighs are covered with towels. A blanket thrown over the apparatus and tucked in under the patient's body, renders the chamber air-tight. The lights are now switched on and left burning until the patient complains of the heat. With the ordinary bulbs a temperature of about 200 degrees is reached within twenty minutes. From time to time, an end of the blanket should be lifted and the perspiration wiped from the exposed abdomen. The patient should have a moist cloth on the forehead and be urged to drink large quantities of cool water. The treatment lasts, on an average, thirty minutes and may be administered once or twice every day. These are not hard and fast rules, but we must be guided by the behavior of the patient. As soon as she complains of intense burning, the treatment must be interrupted. At each treatment, her tolerance may increase and the duration of the treatment may be lengthened accordingly. If there should be a marked rise of temperature following, the treatment should be discontinued temporarily and another cautious attempt made a few days later. After the treatment, the patients should be permitted to cool off gradually by leaving them in the apparatus for another half hour or by wrapping them in warm blankets; and whenever feasible they should receive a cool sponge bath. A combination of the hot-air treatment with other conservative methods such as vaginal douches, tampons, etc., will be found useful.

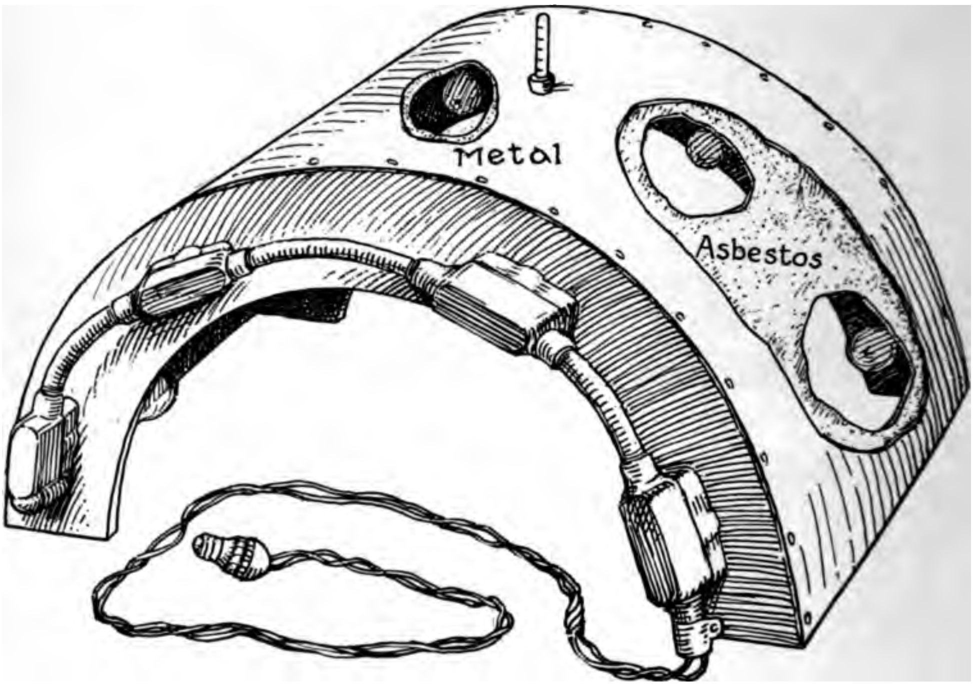


Fig. 776.—Apparatus for dry heat treatment. It may be connected to the ordinary socket on any light circuit. There are eight electric lights. The lights used may be varied in size and number as desired. The metal case with heavy asbestos lining and the careful covering of all wires, permits the bed clothing to be laid over this apparatus without danger.

"The principal indication for hot-air therapy is found in cases of chronic pelvic exudates. There is a rapid diminution of pain and a complete cessation of discomfort after four or five treatments. Symptoms due to pressure subside fairly promptly. While in a certain percentage of the cases, the size of the inflammatory tumor is not appreciably decreased, in the large majority the exudative mass is absorbed more or less quickly. There are cases in with a homogeneous mass of cement-like hardness fills the entire pelvis. In these, the treatment will lead to absorption of the exudate leaving the uterus and adnexa unaffected. Where an exudate shows a marked tendency to abscess formation, incision and drainage is the proper procedure, but subsequent hot-air treatment will hasten complete recovery and restitution.

"In dysmenorrhea without tangible pathologic cause, particularly in young girls, the application of dry heat frequently renders menstruations painless. In amenorrhea due to underdevelopment of the genital organs, the heat treatment in conjunction with endocrine medication will often stimulate growth and function of the uterus.

"Finally, the treatment has been found exceedingly useful in a number of conditions arising after operation, such as infiltration of the incision, postoperative fistulae, paralysis of the intestines, etc."

SPECIAL MEASURES

1. If there is a collection of **pus low** in the pelvis, open and drain it by vaginal operation, according to the technic given in detail under acute pelvic inflammation (Figs. 738, 739). In the after-treatment the drainage tube will have to remain in longer than for an acute abscess of the same size, for the chronic abscesses have thicker walls and hence collapse more slowly.

2. If there is an inflammatory **mass high,** which probably contains pus or which continues to give serious trouble after a thorough trial of the general measures (that is, after those measures have been used faithfully for several weeks along with rest in bed as thought best), then comes the question of abdominal operation. Intimately associated with this is another important question, namely:

What Is the Preferable Time for Abdominal Operation for a Chronic Inflammatory Mass in the Pelvis?

In order to answer this important question clearly, the author, some years ago, made a special study of the subject. This study and the very definite and practical conclusions resulting therefrom were embodied in a paper before the American Gynecological Society (Surg., Gynec. and Obst., October, 1909). The facts there set forth are of fundamental importance to an understanding of this subject and to the safe and successful handling of pelvic inflammatory masses, and they are reproduced in the following pages.

In a considerable proportion of the cases of chronic suppuration in the pelvis the pus is sterile at the time of operation. In 634 cases examined bacteriologically (collected by Andrews) the results, excluding tuberculous cases, were as follows:

Sterile	55. per cent
Only saprophytes	6. per cent
Gonococcus	22.5 per cent
Streptococcus and staphylococcus	12. per cent
Pneumococcus	2. per cent
Bacillus coli communis	2.5 per cent

In a later résumé, by Hyde, comprising nearly three thousand cases (2973 cases, excluding tuberculous), the bacteriologic findings were approximately as follows: sterile, 1998; gonococcus, 579; other bacteria and mixed infections, 456.

It is interesting to note the steps in the development of this knowledge. Long ago it was observed that, of the patients subjected to abdominal operation for pelvic suppuration, the old cases usually recovered promptly, while the recent cases frequently developed fatal peritonitis—that is, operation in the acute stage was far more dangerous than operation in the chronic stage.

The splendid advance in gynecologic work in the last few decades is based on facts ascertained in two ways. Some facts came to the surface largely through pathologic and bacteriologic investigations, while others were ascertained by experience at the operating table and the bedside. The fact above referred to belongs to the latter class; it was learned by experience, often bitter experience, and many lives were lost before the lesson was fully learned.

This fact, after having been clinically established, was the occasion of much curiosity, as the explanation was not at hand. It seemed paradoxical that long continuance of a debilitating disease should put the patient in better condition for a serious operation for the same.

What could be the explanation? Why did chronic inflammation confer such immunity from peritonitis after operation? One early theory was that the immunity was due largely, if not wholly, to the local effect on the adjacent peritoneum, choking its absorptive channels so that septic absorption could not take place so readily, and modifying the membrane so that it was not as good culture ground for the bacteria. According to another hypothesis the body resistance generally became "accustomed" to the local irritation in the pelvis and consequently was less disturbed by the added irritation of operation, and also, owing to the preparedness, so to speak, of the general resistant forces of the body, they were better able to combat invasion. These explanations were but gropings in the dark, but nevertheless they contained truths which have been verified and elucidated by the epoch-making investigation into the resistant functions of the leucocytes and the blood serum, and into the modus operandi of antitoxin and vaccine therapy.

The decisive step in the solution of the riddle was the inauguration of systematic bacteriologic examination of specimens removed in operations for pelvic suppuration. These bacteriologic examinations were undertaken primarily for the purpose of determining the etiology of salpingitis, particularly what proportion of the cases were due to the gonococcus and what proportion to other bacteria. The results were disappointing. In a considerable proportion of the cases no bacteria could be found and hence in those cases the etiology of the trouble could not be bacteriologically determined. But, though disappointing so far as concerned the definite etiologic classification of cases, the facts thus ascertained were very illuminating in regard to the important and puzzling question as to why immunity was secured by waiting. In many cases the bacteria had died and disintegrated and the pus was sterile—that was the reason serious inflammation seldom followed abdominal section for old tubal abscesses, even though considerable pus often escaped among the pelvic structures during the enucleation. On the other hand, in fresh cases the least peritoneal contamination by the contained pus was often followed by fatal peritonitis because the bacteria were not dead, but active and virulent. Another fact ascertained was that in many of the old cases in which bacteria were still present they were so attenuated that the pus was practically sterile.

Persistence of Virulence—Classification of Cases

It having been established that sterilization gradually takes place within a reasonable time in most cases, the next problem is to determine the period of time required for the automatic sterilization or effective attenuation in the different classes of cases.

The persistence of virulence depends largely on the character of the infection. The two principal infectious agents in pelvic inflammatory masses are the gonococcus and the streptococcus. These two differ widely in the persistence of virulence and also in certain clinical characteristics which can be distinguished before operation.

For the purpose, then, of considering the persistence of virulence in a practical way; i.e., as a guide to treatment—the cases of chronic pelvic suppuration (tuberculous excluded) may be divided into two classes—the **gonococcic** and the **streptococcic.** To be useful, this classification must be made before operation—that is, it must be a clinical rather than a strictly bacteriologic classification. Of course, from a bacteriologic standpoint there are other cases, due to bacteria, but in the present state of knowledge these other cases cannot, as a rule, be distinguished before operation, and, even if they were distinguished, not enough information has accumulated to show the average persistence of virulence in such cases. Consequently, when confronted with a case of non-tuberculous chronic pelvic inflammation, the endeavor should be to decide whether it belongs to the gonococcic or streptococcic class, ignoring for the time the fact that it may possibly be due to other bacteria, which in point of virulence lie between these two extremes.

How may the gonococcic and the streptococcic cases be distinguished before operation? What diagnostic facts are available at that time? Bacteriologic examination of the urethral or uterine or other discharge is of assistance in only a small proportion of these chronic cases, for as a rule the bacteria have disappeared from the discharge. Neither is there at present any well-established specific diagnostic reaction in gonococcus or streptococcus cases corresponding to the tuberculin reaction in tuberculous cases. Hence we must depend on other information obtainable before operation. Fortunately the gonorrheal cases and the streptococcal cases differ usually in two particulars; namely, (a) in the apparent cause of the trouble and (b) in the location of the lesion. As a rule these distinguishing points may be settled and the case definitely classified by an accurate inquiry into the onset of the trouble and a careful bimanual examination.

Uncertain cases are to be classed with one or the other, as the preponderance of evidence warrants, and are to be given treatment accordingly. After operation, bacteriologic examination may show other bacteria, either alone or associated, and, if accurate records are kept of the histories and bacteriologic findings in large series of cases, it may be possible later to form a third clinical class, comprising one or more of the miscellaneous or mixed infections. For the present, however, the two classes, gonococcic and streptococcic, are all that can, as a rule, be satisfactorily distinguished before operation.

Gonococcic Class (Clinical)

In the gonococcic class (clinical) the distinguishing points are: (1) that the pelvic inflammation is preceded by evidence of gonorrhea or comes on without apparent cause, and (2) that the lesion is located in the tube, extending thence to the ovary or adjacent peritoneal surfaces, but not involving the connective tissue (parametrium) to any decided extent. As so much diagnostic importance is attached to these two points, it is necessary to consider them somewhat in detail.

a. Apparent **cause** or mode of onset. As a general proposition it may be said that the gonococcus is the only germ that will spontaneously invade the normal, non-puerperal uterus and tubes. There are exceptions. Riedel reported that of 56 girls under ten years of age operated on for appendicitis, five had peritonitis due, not to appendicitis, but to acute salpingitis. He states positively that the infections reached the tubes by way of the vagina and uterus, and that gonorrhea was excluded in every case. Cultures showed the ordinary pus germs. The inflammation was virulent and every patient died in spite of operative treatment. He observed the same clinical picture in two girls past ten years of age, both of whom died. In contradistinction to these cases in children, he states that he has never seen such penetration of normal genitals by streptococci or staphylococci in the adult.

General experience is in accord with this statement in regard to adults. Purulent inflammation beginning in a normal adult non-puerperal vagina or uterus, and later extending out into the pelvic cavity, may be set down as almost certainly gonorrheal. The patient must, of course, be questioned closely enough to eliminate an early miscarriage and also any intrauterine instrumentation (curettage, intrauterine treatment, sounding in examination, etc.). The probability of gonorrhea is increased if the purulent discharge ("free leucorrhea") began within a few weeks after marriage. Again, in a large proportion of the cases of gonococcal leucorrhea there is urethritis, causing burning on urination and increased frequency of urination. This discharge and disturbance of micturition may last a few days or much longer.

It may precede the pelvic inflammation by a few days or a few weeks or a few months. A history of abscess of one of the vulvovaginal glands has about the same significance as a history of urethritis. These structures are frequently involved in gonococcal leucorrhea, but very seldom in leucorrhea from other causes.

In those cases in which the vaginal and uterine gonorrhea did not cause sufficient disturbance to be noticed, the pelvic inflammation began without apparent cause. A considerable proportion of the gonorrheal cases give such a history. Here, again, one must be careful not to overlook an early miscarriage or some intrauterine instrumentation. Also, it is important to trace the inflammation back to its very beginning, for some cases of puerperal infection are very mild in outward manifestations and do not cause much trouble until there is an exacerbation after several weeks or months. In these cases, however, there is usually a history of some disturbance during the puerperium, from which the patient recovered to a large extent, but not entirely. On the other hand, an inflammatory trouble, at first apparently due to a miscarriage or full term delivery, may on careful questioning be found to antedate the pregnancy and to be due to a preceding gonorrheal infection.

In the examination a search should be made about the external genitals for evidences of an old gonorrhea—signs of previous inflammation of the urethra or of the vulvovaginal glands, such as red spots (maculae gonorrhoicae) in these situations, or secretion that can be pressed from the structures. Bacteriologic examination of discharge from the urethra, vulvovaginal glands, vagina or cervix may show gonococci. Negative findings, however, do not exclude gonorrhea, for in many of the chronic cases the causative bacteria have disappeared from the discharge.

In a certain proportion of cases of gonococcic pelvic inflammation, the extensions of the gonococci into the uterus and beyond took place during the puerperium. It has been shown that the gonococcus may lie practically dormant in the lower part of the genital tract for a long time and extend upward after a labor or miscarriage. Saenger examined 389 pregnant women and found the gonococcus in 100. Steinbuechel examined the lochia in 274 women in whom the puerperium was normal and found the gonococcus in 18 per cent. In Leopold's clinic, 25 per cent of the puerperal infections were of gonorrheal origin. In 179 cases of puerperal sepsis examined bacteriologically by Kroenig, 50 cases were gonococcal, 50 belonged to the sapremic group (miscellaneous saprophytes, most of which did not grow in ordinary culture media) and 79 were due to the ordinary pus bacteria. Puerperal infection due to the gonococcus is nearly always of a mild type, as shown in an instructive article by Taussig. A history indicating that the attack of puerperal sepsis was mild may help some in differentiation, though it must be kept in mind that puerperal infection from other bacteria may also run a mild course. In the cases of puerperal origin, therefore, without positive evidence of gonorrhea, the decision must rest largely on the location of the lesion.

b. **Location** of the lesion. The extension of gonorrheal inflammation is almost invariably along the uterine mucosa into the tube (Fig. 777), and any further extension is toward the ovary and the peritoneal cavity. Gonococci very seldom extend through the uterine wall into the parametrium. Even when they do extend into the connective tissue, they are not likely to form an inflammatory mass there. Steinschneider and Schaefer injected pure cultures of gonococci into connective tissue, but no decided inflammatory action resulted. Though parametrial abscess may occasionally result from gonococci, as demonstrated by Wertheim and others, it is so rare as to be a curiosity.

The characteristic lesion, therefore, of gonorrhea in the pelvis is pyosalpinx, with or without the complicating oophoritis and pelvic peritonitis. The great majority of all pus tubes are due to gonorrheal infection, known or unknown. In 106 cases of purulent salpingitis examined by Menge the findings were as follows: sterile pus in 68, gonococci in 22, tubercle bacilli in 9, staphylococcus in 1, anaerobic bacteria in 2, and streptococci in 4. As we shall see later, the gonococcus often dies out within a comparatively short time, so it is probable that most of the sterile cases originate from the gonococcus. When this fact is taken into consideration, it becomes apparent what a large proportion of the cases of purulent salpingitis are due to the gonococcus and what a small proportion to other bacteria.

In the article mentioned the author gave the details of a series of cases of the gonococcic class (clinical), showing the two principal diagnostic points before operation, the interval of time from infection to operation, the bacteria found at operation, and the degree of virulence (as indicated by the result of the operation). The cases thus tabulated in detail may be taken as typical of the hundreds of cases of this common class, which include probably five-sixths of the chronic inflammatory masses in the pelvis. These cases are so common and run such a uniform course that but few are reported in sufficient detail to show definitely the apparent cause, the interval of time from infection to operation, the location of the lesion and the bacteriologic findings. It would be well if several series from the larger clinics were reported, so as to show the points mentioned, that the preoperative diagnosis of the character of the infection and the probable virulence may be more clearly defined.

It will be noticed in the article that in some of the cases belonging clinically to the gonococcic class, bacteriologic examination showed other bacteria instead of the gonococcus. But they are placed in this clinical class because of the apparent cause and the location of the lesion—the only decisive information usually obtainable before operation. It is only by such careful classification of the cases before operation and careful bacteriologic examination after operation, that a useful classification can be established and errors gradually eliminated.

The lessons to be drawn from the consideration of the cases of the gonococcic class (clinical) may be stated briefly under three heads, as follows:

Reliability of the Diagnostic Points Available Before Operation.—From the cases cited, which are typical of the hundreds belonging to this class, it is evident that the two points mentioned (the apparent cause and the location of the lesion) may be depended upon to eliminate the virulent streptococcal cases. Where these two clinical signs agreed, bacteriologic examination of the pus found showed either the gonococcus or absence of bacteria, with but one exception. This exceptional case was rather acute and appeared gonorrheal. The trouble began shortly after marriage with a purulent vaginal discharge and local irritation. The discharge was not examined bacteriologically. An adnexal mass appeared on each side and extended into the culdesac. The pus pockets in the pelvis were evacuated by vaginal incision. Pus was found in the culdesac and in both tubes. It was supposed to be gonorrheal. Bacteriologic examination showed pneumococci in abundance, but no gonococci. In the cases where the two points did not agree, there were various bacteriologic findings. In uncertain cases the location of the lesion was principally depended upon for classification. Except where the trouble was clearly from puerperal sepsis, a marked tubo-ovarian mass without parametrial involvement admitted the case to this clinical class. In no instance did such a case show streptococci.

In the cases due to puerperal sepsis great care should be exercised in excluding streptococci before admitting the case to the gonococcic clinical class. The apparent location of the lesion helps, but cannot be depended upon entirely in these puerperal cases. A few cases showing streptococci presented masses at first supposed to be purely adnexal. Most of these, however, on more thorough examination at the time of operation, showed that the process was located partly in the connective tissue. Streptococcal pyosalpinx without associated parametritis is certainly very rare. Miller, who reported a number of streptococcal infections and investigated bacteriologically more than a hundred cases of pelvic inflammation at Johns Hopkins Hospital, stated that he had never encountered a frank pyosalpinx due to the streptococcus. Whiteside and Walton, in a series of thirty cases of pyosalpinx examined for bacteria, found the streptococcus in three, but the question of coincident parametrial involvement does not seem to have been investigated. In a series of 106 cases of suppurative salpingitis, Menge demonstrated the streptococcus in 4, but nothing definite is said as to the parametrial involvement in these cases.

Persistence of Virulence.—In the clearly gonococcic cases the bacteria were found to be absent or attenuated, as a rule within two to four months after infection. In some cases gonococci were found after several months or a year or even several years, but they had lost their virulence. Hartman and Morax state that all their specimens showing gonococci were from patients with rather recent inflammation, the duration of the trouble varying from three weeks to four months, and averaging four to five weeks.

Gonococci may die and disappear within a few weeks. In two cases detailed in the author's article, where examination of the pus showed it to be sterile, the duration of the trouble was only two months in one case and five weeks in another. Gonococcic pus confined in the tube may become sterile in six or eight weeks, but it may, on the other hand, continue active for a considerably longer time. Radical operation, therefore, should ordinarily be postponed to at least three months from the onset of the trouble.

Why Wait for Sterilization or Attenuation in Gonococcal Cases.—There are two reasons. In the first place, a considerable proportion of the pelvic inflammatory masses disappear without operation if Nature is given a chance for three or four months. Many cases of supposed pyosalpinx so recover. The expression "supposed pyosalpinx" is used advisedly. It is not necessary to enter into the controversy over the possibility of the spontaneous cure of pyosalpinx, hence the statement can be limited to the inflammatory masses supposed to be pyosalpinx, of which undoubtedly a considerable proportion disappear when Nature is given a reasonable chance.

The second reason for waiting for automatic sterilization or effective attenuation of the pus within the quiescent mass, is that active gonorrheal pus is by no means harmless. General peritonitis due to the gonococcus is not so rare as formerly supposed. Hunner and Harris collected eighteen cases supported by bacteriologic proof, and seven of these patients died. They found also twenty-one cases in which, though bacteriologic proof was lacking, the clinical evidence indicated strongly that the peritonitis was gonococcal, and five of these patients died. Again, peritonitis is not the only danger from operation on a quiescent but still active collection of gonorrheal pus. Price reports a case in which such an operation caused general dissemination of the bacteria, with involvement of the joints and endocardium and finally death fifteen days after the operation. There was no evidence of peritonitis. A number of cases of general dissemination of the gonococcus have been reported. Hunner cultivated gonococci from the blood taken from the arm of a patient five days after abdominal section for supposed gonococcal perito-

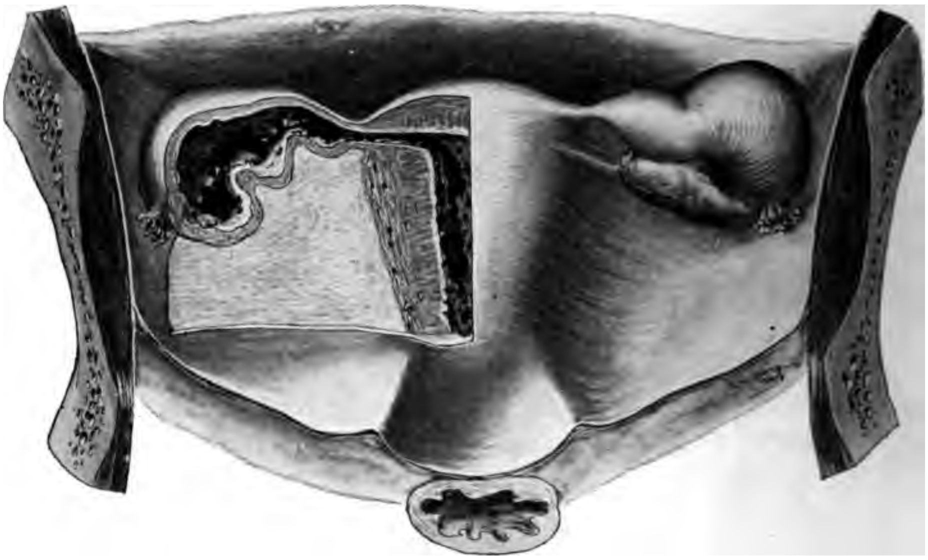


Fig. 777.—Gonococcal infection of uterus and resulting lesion. Gonococcal inflammation extends along the mucosa to the tube (as indicated at the left), and causes pyosalpinx (at right).

nitis, and in a fatal puerperal case Harris and Dabney demonstrated gonococci on the valves of the heart.

Streptococcic Class (Clinical)

The distinguishing characteristics are (1) the apparent cause of the trouble and (2) the location of the lesion.

a. Apparent **cause.** Nearly all the streptococcic inflammatory masses in the pelvis can be traced to sepsis following labor or miscarriage. In the adult, streptococci do not spontaneously penetrate the non-puerperal uterus. Aside from labor or miscarriage, streptococcus infection may be due to curettage or other uterine operation, to intrauterine application or sounding, to a stem pessary, to abnormal conditions caused by cancer or myoma, or chronic inflammation. If a pelvic inflammatory trouble cannot be traced to one of the causes above mentioned, it is almost certainly not streptococcic. In taking the history, care must be exercised not to miss an early miscarriage or an intrauterine treatment. Care must be taken also to trace the trouble back to its very beginning, otherwise an exacerbation remote from the causal miscarriage or labor may be mistaken for the beginning of the trouble.

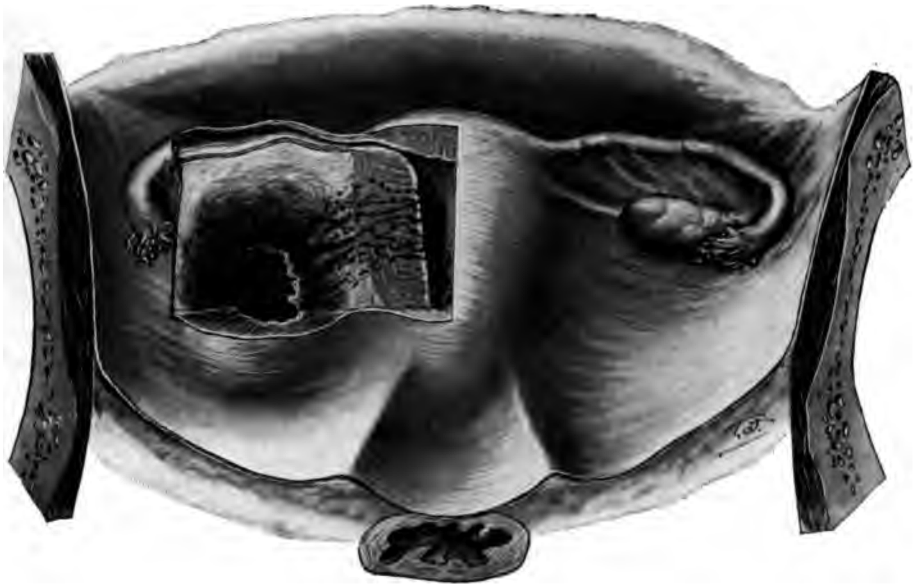


Fig. 778.—Streptococcal infection in uterus and resulting lesion. Streptococcal inflammation extends through the uterine wall into the connective tissue (as indicated at the left), forming a mass in the broad ligament.

On the other hand, not all puerperal cases are streptococcic. About 25 per cent of puerperal infections are gonococcal. They are usually of a mild type and subside quickly, but it must be kept in mind also that other puerperal infections (staphylococcic and even streptococcic) may run a mild course. Consequently the mildness of the preceding septic attack must not be given too much weight. Outside of external evidences of gonorrhea (about the vulva or in the discharge), most dependence is to be placed on the location of the lesion. Streptococcus lesions are usually parametrial, while gonococcus lesions are usually tuboovarian.

Another complicating factor in these puerperal cases is that there may be a mixed infection, causing both kinds of lesions to be present. Stone and McDonald reported such a case. This case furnished also a beautiful and striking illustration of the fact that the gonococcus spreads by way of the mucous membrane and the streptococcus by way of the connective tissue. The gonococci occupied the right tube and extended thence into the peritoneal cavity, while the streptococci occupied the right broad ligament and extended thence into the peritoneal cavity, where the two forms of bacteria met. Another possibility in these puerperal cases is that the two forms of bacteria may be mixed in one lesion—e.g., in a pyosalpinx. This is evidently very rare, but it has occurred, and the possibility of it should make us always suspicious of a postpuerperal inflammatory mass wherever located. In such a case the evidences for and against the presence of streptococci should be most carefully canvassed before deciding to subject the patient to abdominal section.

b. **Location** of the lesion. A chronic lesion in the pelvis of streptococcic origin is nearly always in the connective tissue (parametrium). Unlike the gonococcus, the streptococcus does not progress along the mucosa into the tube, but penetrates the wall of the uterus and extends into the connective tissue (Fig. 778). It not infrequently extends from the connective tissue to the peritoneum, causing peritonitis. Of course, in exceptional cases streptococci may pass from the uterus into the tube, but in such cases they are likely to pass on through the tube and cause fatal peritonitis. Consequently, in the streptococcic cases that survive the acute attack, and come later for treatment for an inflammatory mass, the lesion nearly always involves the connective tissue (parametrium). As before mentioned, Menge found the streptococcus in four cases of pyosalpinx, while Whiteside and Walton found it in three, but parametritis was not excluded. The last mentioned authors endeavored to produce streptococcus salpingitis experimentally by injecting into the uterus in rabbits pure cultures of streptococci and also mixed cultures of streptococci and staphylococci. In no instance did salpingitis result. One rabbit died of acute streptococcus septicemia, while the others simply developed a purulent vaginitis for a few days and then recovered, and when replaced in the rabbit pen became pregnant and bore litters of six rabbits each. Miller, in the bacteriologic examination of 127 cases of pelvic inflammation, found the streptococcus 7 times, but in no case was the lesion a pyosalpinx alone. There are very few exceptions to the rule that streptococcal masses in the pelvis are parametrial in whole or in part.

Are all parametrial inflammatory masses streptococcic? Nearly all. That parametrial suppuration is usually due to the streptococcus is substantiated by Rosthorn, Bumm, Doleris and Bourges, West, Cullingworth and others. Hartman and Morax found it in 21 cases of parametrial abscess. In every such case operated on by Fritsch the streptococcus was found to be the cause. It is only occasionally that staphylococci and other bacteria are found either alone or associated with the streptococcus. As parametrial inflammation is nearly always due to the streptococcus, every case presenting a parametrial mass should be placed in the streptococcic class until it is definitely proved to be due to some other cause.

The distinguishing characteristics of a parametrial mass (chronic) are: (a) its situation in the connective area, usually in the broad ligament; (b) its low situation in relation to the uterus, often coming far down beside the cervix; (c) its intimate blending with the uterine wall, as though it were a part of the same; (d) its intimate blending with the pelvic wall, as though it were an outgrowth from that structure; and (e) its hardness, often being so hard as to simulate a cartilaginous or bony tumor growing from the pelvic wall. A tuboovarian mass, on the other hand, is distinguished by its being situated high in the tuboovarian region, or prolapsed into the culdesac; by its not blending so intimately with the uterine wall, a distinct groove usually marking the point where the two come in contact; by its not blending so closely with the pelvic wall; by its presenting to the examining finger a portion of the rounded outline of the tube or ovary; and by absence of the cartilaginous hardness often seen in chronic parametrial masses.

In the article are given the details of a series of cases of the streptococcic class (clinical), showing the two principal diagnostic points before operation, the interval of time from infection to operation, the bacteria found at operation and the degree of virulence (as indicated by the result of the operation).

From this series of cases of the streptococcic class (clinical) the following facts may be adduced:

Reliability of the Two Diagnostic Points Available Before Operation.—When the history showed that the trouble originated from labor or abortion and the examination showed a well marked parametritis, streptococci were found in every case except one. This one exception (case 16) was Hunner's case, and he was not altogether satisfied with the bacteriologic examination, but stated that he regarded the case as streptococcal in spite of the negative findings.

When the two points do not agree, then the principal weight should be given to the location of the lesion. But not a sufficient number of carefully observed cases has accumulated to define accurately how great dependence may be placed on the location of the lesion in these uncertain cases. This is a point to be further investigated. For the present these uncertain cases should be considered with great care in order that no streptococcic case be allowed to slip into the gonococcic (abdominal section) class.

Persistence of Virulence.—The virulence of the streptococcus persists indefinitely. Miller reports one case in which the bacteria persisted for six years and another in which they persisted for twelve years. Martin states that streptococci have been found fully virulent in a pelvic inflammatory mass after nineteen years. In one instance (case 19) streptococci apparently disappeared in six months, but the pus also disappeared. The case was one of severe sepsis following labor. On the eighth day vaginal incision into a pelvic abscess evacuated pus containing streptococci. Six months later, a mass persisting, a vaginal incision was made into the culdesac and the mass. No pus was found, but there was serous fluid showing staphylococci alone.

Automatic sterilization of a streptococcus abscess is perhaps possible, but it is so rare that it is not to be counted on. A streptococcal mass in the pelvis is always dangerous, and abdominal section for the same at any time is likely to be followed by a fatal peritonitis. The cases tabulated in the article mentioned give striking proof of the seriousness of intraperitoneal operation in these cases.

Character of Operation.—The only safe way to operate for streptococcal pus collections is by the extraperitoneal method. If possible, the pus collection should be reached and evacuated per vaginam. If this cannot be accomplished, it may be practicable to drain the abscess by extraperitoneal operation above Poupart's ligament, as was done in some of the cases mentioned. Intraperitoneal operation in these cases should be undertaken only when the patient's life is threatened by the severity of the inflammation and it is impossible to reach the mass in a less dangerous way.

General Conclusions

1. In more than half of the cases of chronic suppuration in the pelvis the pus is sterile at the time of operation, showing that sterilization of the infected focus takes place automatically within a reasonable time in the majority of cases.

2. Abdominal removal of the mass while the bacteria are active and virulent results in fatal peritonitis or localized infection in many of the cases. Abdominal removal of the mass after the bacteria are dead or greatly attenuated is almost never followed by infection, even though there is extensive escape of pus into the pelvis.

Hence abdominal operation for a chronic inflammatory mass in the pelvis should not be undertaken before the period of probable sterilization, except in those rare cases in which, in spite of palliative measures, the patient's life is threatened by the severity of the inflammation and the infected focus cannot be satisfactorily drained extraperitoneally.

3. The time required for the death of the bacteria or effective attenuation of the same varies greatly in the different cases. The persistence of virulence depends largely upon the character of the infection. The two infections concerning which definite information has accumulated as to persistence of virulence are the gonococcal and the streptococcal.

In the gonococcal cases the bacteria are dead or attenuated to practical sterility within three or four months from the beginning of the trouble. In such cases abdominal section may be safely undertaken after this period. In the streptococcal cases, on the other hand, the bacteria live and retain their virulence indefinitely. In some cases there seems to be a diminution in the virulence, but this is erratic and not to be depended upon. Abdominal section for a mass of streptococcus origin is never safe. Such an operation at any time, even years after the infection, is liable to be followed by fatal peritonitis.

4. These two classes may be distinguished before operation in most cases, the distinguishing characteristics of each being found in the **apparent cause** of the trouble and the **location of the lesion,** as already explained in detail.

5. What is the preferable time for abdominal operation for a chronic inflammatory mass in the pelvis?

a. In a case that is clearly gonococcic (agreement on the two points—the apparent cause of the trouble and the location of the lesion) abdominal operation may be considered safe after three or four months from the onset of the trouble. If after this time the mass is a source of serious irritation in spite of palliative treatment, it should as a rule be removed. On the other hand, if there is marked improvement, it is better to wait, as Nature may bring about recovery without operation.

b. In a case that is clearly streptococcic (agreement on the two points) abdominal section is never safe. Even where the temperature and pulse are normal and everything quiescent, intraperitoneal operation for the mass is liable to cause the patient's death from streptococcal peritonitis.

c. In a case that is doubtful (disagreement on the two points) a most careful study should be made of all the features of the case and every helpful diagnostic method should be brought into use to aid in reaching a positive conclusion. No intraperitoneal operation should be undertaken until the streptococcus is excluded with reasonable certainty. In a doubtful case in which the abdomen is opened on the supposition that the mass is tubo-ovarian and it is found before adhesions are much disturbed that the mass is principally in the connective tissue (parametritic), the route of attack should be changed to extraperitoneal (per vaginam or above Poupart's ligament) and the abdominal wound closed. Such a lesion probably contains streptococci and the adhesions of omentum and bowel, which cause the deceptive mass high in the tubal region, constitute Nature's barrier between the virulent bacteria and the peritoneal cavity. When this barrier is broken down, the way is opened for a fatal peritonitis.

6. There are three reasons for calling special attention to this subject: **a.** A matter of such vital importance should be given more prominence in textbooks and in instruction to students, and in society proceedings and discussions concerning pus collections in the pelvis. b. Lives are still being sacrificed by operators who seem unaware of the great danger of abdominal operation for inflammatory masses following puerperal sepsis. c. Further investigation (with careful recording in large series of cases of the apparent cause of the trouble, the location of the lesion, the interval of time from infection to operation, the bacteriologic findings, and the result of operation) is required, that the definite classification of the cases before operation, as above indicated, may be firmly established and errors eliminated.

Curtis (Surg. Gynec. and Obst., Dec., 1921) has presented a most careful study of the bacteriology of the removed tubes in a very large series of cases, and confirms the conclusions given above. He emphasizes the following facts: Approximately 80 per cent of the cases of salpingitis are of gonorrheal origin, 15 per cent are due to other pus-producing bacteria (principally the streptococcus) and 5 per cent are tuberculous. Neither the staphylococcus nor the colon bacillus is of much importance in the causation of salpingitis, though the latter is a frequent secondary infection. Gonococcal salpingitis tends to self-sterilization within a short time, recurring gonococcal activity being due to reinfection from without or from the chronically infected lower genital tract. Streptococcal inflammations yielded streptococci many months, and even years, after the acute process had subsided.

3. **Avoid Radical Operation** in those cases in which the examination shows only a somewhat thickened and tender tube (catarrhal salpingitis), or a slightly enlarged and sensitive and perhaps prolapsed ovary (cystic ovary), or adhesions with some induration and fixation, but with no distinct mass. Give a thorough trial to the nonoperative measures previously mentioned, with such additions and modifications as the peculiarities of the case may suggest. In those cases in which all signs of active inflammation have subsided, leaving only adhesions binding the uterus or ovary in abnormal position or distorting the tube, much benefit may sometimes be derived from pelvic massage, with stretching of adhesions, or from pressure-treatment, or from the two in combination. In cases with troublesome uterine discharge and excessive menstrual flow or painful menstruation, thorough dilatation and curettage is advisable. This tends to diminish the discharge and menstrual suffering, and in some cases it has a decided beneficial effect on the adjacent adnexal trouble. Furthermore, it gives a chance for a thorough examination under anesthesia, by which the exact condition of the ovaries, tubes and uterus can be more accurately determined. In cases with persistent pain without decided palpable lesion—i.e., those cases in which the nervous element is marked and in which the affection approaches the character of a neuralgia or neuritis—electricity may give some relief. It is in these cases also that a tonic regimen (with general massage, brush rubs, salt rubs, etc.) and antineuralgic remedies are especially indicated, and often produce a cure with little or no local treatment.

Careful study should be made of the patient generally—of all the organs. In some such cases it will be found that the principal trouble is some general disease or some local disease in another portion of the body, the pelvic disorder being of secondary importance. If nothing is found outside the pelvis to account for the patient's symptoms and all other measures fail to relieve the pelvic distress, open the abdomen and ascertain the exact condition of the pelvic organs and vermiform appendix and then correct, as far as possible, the pathologic conditions found.

4. In the operative cases, when the patient is under thirty-five years of age and the pathologic condition will permit, **preserve enough ovarian tissue** to continue menstruation and enough fallopian tube to make pregnancy possible if the organs do not seem seriously involved in the inflammatory process. Preservation of an already diseased organ may necessitate another serious operation at a later date.

In those cases where all active inflammation has disappeared, leaving only adhesions and exudate, it is often possible to preserve in place part of an ovary and part of a tube, which by proper treatment may continue their functions.

Even if pregnancy does not take place, the simple fact that it may take place—that it is possible—leaves the patient in a much better frame of mind.

If the uterus must be removed, one ovary at least should be preserved, if it is not diseased, because the preservation of any ovary, or even part of an ovary, tends to prevent those troublesome nervous symptoms which frequently accompany the artificial menopause and which sometimes become serious.

Prognosis

What are the ultimate results in cases of chronic pelvic inflammation? What answer shall be given to the patient who asks, "Doctor, will the proposed treatment make me a well woman?"

Now the results differ much in various cases, and in order to answer this question in a comprehensive way it is necessary to divide the cases into two great classes—the first including those cases in which the symptoms are apparently all dependent on an evident lesion, and the second including those cases in which there are symptoms the cause of which is not clear.

1. Where there is a marked lesion in the pelvis of such nature as to account for all the symptoms and the patient is otherwise in good health, proper treatment will in all probability effect a cure. The treatment must, of course, be carried out carefully and vigorously according to the indications in the particular case. And in any case it will extend over several months, for even in the cases in which the pelvic lesion can be largely removed by operation the patient will require careful after-treatment to put her in good health.

As to the promises you make to the patient, be careful. You must give the patient all the encouragement possible, for encouragement helps in the cure, but you must not commit yourself in such a way that, if something unforeseen prevents a cure, you will be in the position of having promised something that you cannot give. This subject of prognosis and promises to patients is one of the most trying in medical and surgical work. Most diseases may, by treatment, be either cured or improved so much that the patient thinks them cured. Advertising quacks take advantage of this fact and promise certain cure in all cases—"Cure guaranteed." Some of the patients are, no doubt, really cured, and others are so much improved for the time being that they think themselves cured and shout accordingly, while those who are not improved are so ashamed of having gone to a quack that they say nothing about it, and so the impostor goes on without hindrance. But the reputable physician must be careful with his promises. We deal in facts, not deceptions. Our duty is to employ the best possible means for the relief of the patient and the cure of her disease, and at the same time to give her all the encouragement possible. There are, however, so many uncertainties that enter into the problem that it is, in most cases, best to say but little about the prognosis unless the patient asks directly concerning it. If the patient requests a definite statement as to just what chance she has of permanent relief, promise her all that the circumstances will warrant—giving the most favorable construction to all phases—but always with this proviso, said to the patient herself or to a near relative, that in spite of the best treatment there is a possibility of the development of conditions which would give a different result. This caution in promises is particularly important in surgical work, for many patients are prone to expect from an operation the cure of every existing disturbance, whether it comes within the scope of the operation or not.

2. In cases where there is no marked pelvic lesion, or where, in addition to a marked lesion, there are symptoms that are not accounted for by the pelvic disease, the prognosis is uncertain. The fact that there are symptoms without apparent cause means that there is a hidden factor in the case, and that hidden factor may continue to cause much trouble after the obvious lesion is removed. Promise as much as you can count on safely, but no more. Sometimes very serious or troublesome symptoms will subside after correction of an apparently slight pelvic disorder. Many symptoms, particularly nervous symptoms, apparently not closely connected with the pelvic disease, disappear on the cure of the pelvic disorder, much to the delight of the patient and of the physician. On the other hand, many symptoms, particularly nervous symptoms, apparently due to well marked pelvic disease, persist after the removal of the disease, much to the disappointment of the patient and the physician. In some of these cases the troublesome symptoms had no connection with the pelvic trouble, but were caused by some entirely separate disorder. In other cases the nervous symptoms were really caused by the pelvic disease, but through long continuance of the irritation there was produced in the nervous system a pathologic condition capable of persisting long after the removal of the causative lesion.

Then, again, there are certain cases of hereditary tendency to insanity in which a serious pelvic disease is sufficient to cause a breakdown and the development of mental disorder. In such a case, though you may hope for improvement, you cannot promise much, for the mental disorder, once excited, may persist in spite of the removal of the exciting cause. Again, occasionally a patient with this tendency to mental disturbance will get along very well until subjected to operation for some disease, pelvic or otherwise, and then the added strain of the operation upsets the mental balance and she has a nervous breakdown. These are, of course, exceptional circumstances, mentioned simply to show how many things the physician must think of—what a broad view of the subject he must take—in giving a prognosis as to the ultimate result.

CHAPTER XI

OTHER AFFECTIONS

of Fallopian Tubes, Pelvic Peritoneum and Pelvic Connective Tissue

PELVIC TUBERCULOSIS

Pelvic tuberculosis is tuberculosis of the fallopian tubes or pelvic peritoneum or ovaries, or of all these structures together. It is known also as "tuberculous salpingitis," "tuberculous pelvic peritonitis" and "tuberculous oophoritis."

Etiology

The same factors are operative here as in tuberculous lesions elsewhere; namely, tubercle bacilli and lowered tissue resistance. As to how the tubercle bacilli reach these deep-seated structures, and why they locate here, is an interesting story and one not yet completed.

The following factors have a bearing on the etiology of the affection:

1. Tuberculous lesions in distant organs—for instance, in the lungs. From these distant lesions the bacilli get into the blood stream and are carried to various parts of the body, frequently to the fallopian tubes. In some cases the fallopian tube lesions constitute the only secondary lesion found.

2. Tuberculous lesions in adjacent organs, as the bladder, rectum, intestines or abdominal peritoneum. The most frequent are tuberculous appendicitis and tuberculous ulceration of the small intestine. In the former the process extends directly along the peritoneal surface to the pelvic peritoneum and the fallopian tubes and the ovaries. In the latter there may be an adhesion between the irritated peritoneal surface over a tuberculous ulcer of the intestine and the surface of a tube or ovary, or of the pelvic peritoneum. After adhesion the process gradually extends through the intervening tissue.

In tuberculosis of the bladder or rectum, penetration of intervening tissue may take place, thus bringing the bacilli in contact with the structures under consideration.

3. Occasionally the tuberculous infection may come by way of the genital tract from lesions lower—for example, from tuberculosis of the uterus, or of the vagina, or of the vulva. This, however, is very rare, the process usually extending from above downward instead of from below upward.

Pathology

The cases of pelvic tuberculosis may be grouped roughly into two **classes—(A) those in which the peritoneum is principally involved and (B) those in which the** process is located principally in one or both fallopian tubes.

(A) Peritoneal Tuberculosis

Peritoneal tuberculosis begins as a deposit of fine tubercles in the pelvic peritoneum. This deposit may take place slowly or rapidly. If it takes place slowly, the disturbance may be slight and the symptoms hardly noticeable. If the deposit takes place rapidly, it produces the condition known as acute miliary tuberculosis of the pelvic peritoneum. In this marked miliary form the whole pelvic peritoneum covering the various structures may be closely studded with the tubercles (Fig. 779).

This produces pelvic peritonitis. The peritoneum about the deposits is injected, reddened and lacks its normal luster. Ascites fluid appears and the fluid may have a bloody tinge. The fluid may be free in the peritoneal cavity, with no limiting adhesion, or there may be adhesions that form pockets in which the fluid is confined (encysted fluid). In this form the tuberculous process is usually widespread, involving a large part of the general peritoneum. The intestinal coils may be adherent to each other or to the parietal peritoneum, or to all the pelvic structures. The adhesions are usually frail and bleed easily upon being separated, but the bleeding soon stops. On account of the tendency to peritoneal effusion in this miliary form of tuberculosis, the adhesions are not usually extensive.

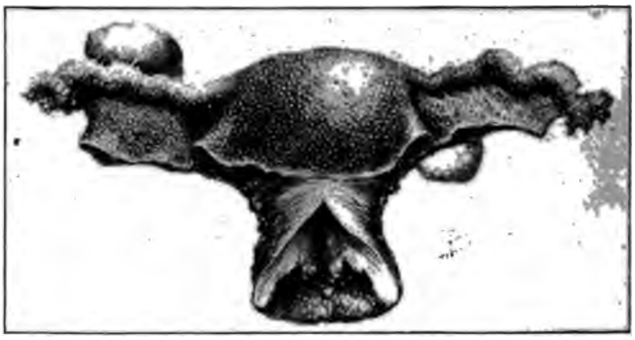


Fig. 779.—Pelvic tuberculosis—peritoneal type. (Kelly—*Operative Gynecology.*)

After development to this stage the tubercles may pursue either of two courses.

a. The tubercles may undergo fibroid change. The active symptoms disappear, the fluid is absorbed, and the diseased areas become scar-tissue. This is called "fibroid tuberculosis." It is a limitation of the tuberculous process and constitutes a temporary cure of the disease.

b. Instead of the tubercles passing into this quiescent condition, they may spread and coalesce and break down, and thus the process becomes progressively destructive. The tuberculous areas undergo necrosis and caseation, dense adhesions take place, collections of tuberculous pus form, and all the pelvic structures become bound together into an irregular mass, with broken-down tuberculous lesions scattered throughout.

(B) Tubal Tuberculosis

In tuberculosis of the fallopian tubes the process, instead of appearing first in the peritoneum, may start in the interior of a tube.

In this situation three forms are recognized—(a) miliary tuberculosis, (b) chronic fibroid tuberculosis and (c) chronic diffuse tuberculosis.

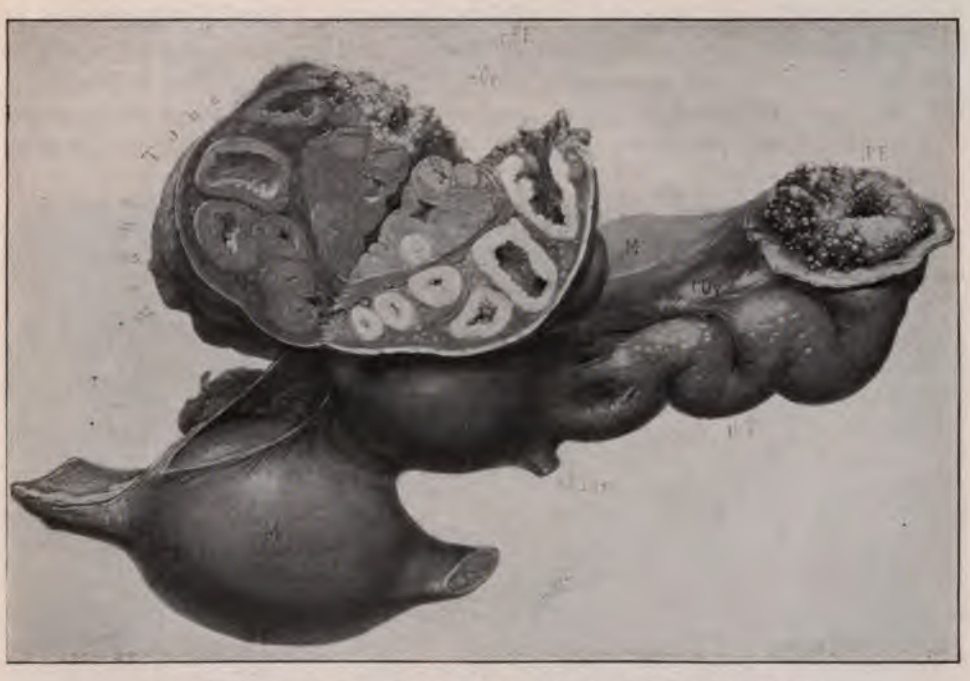


Fig. 780.—Pelvic tuberculosis—tubal type. (Kelly—*Operative Gynecology.*)

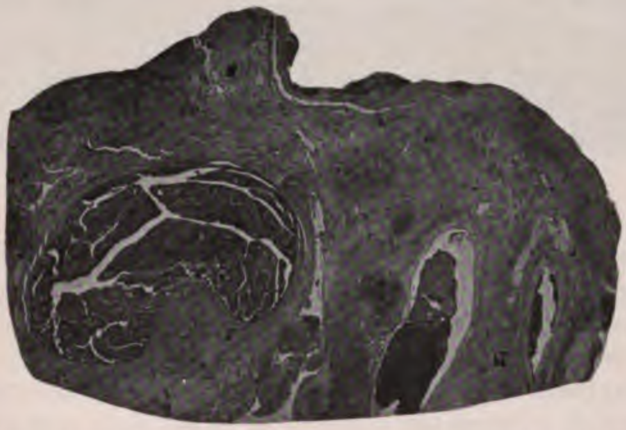


Fig. 781.—Tuberculosis of the tube. The tubal lumen is shown in the left half. Notice in the solid area near the center of the tube, some small grayish patches. These are tubercles. Gyn. Lab.

a. Miliary tuberculosis of a fallopian tube presents the same characteristics as miliary tuberculosis of other mucous membranes—that is, there are fine tubercles scattered beneath the epithelium and not yet broken down.

Owing to the structure of the tube, the miliary tubercles readily escape observation unless the removed tube is examined microscopically. This form of tuberculosis may give rise to but few symptoms, and may cause so little disturbance that there is no suspicion of serious disease.

b. If these tubercles fail to pass on to the stage of caseation, but instead become surrounded by a large amount of connective tissue and pass into a quiescent state, we have the condition known as "fibroid tuberculosis of the tube." The tube is somewhat thickened, and hardened and enlarged by the infiltration, but there is little or no breaking down of the lesions.

c. If, on the other hand, the tubercles progress to the stage of caseation and break down, there results the condition known as "chronic diffuse tuberculosis of the tubes." The tube is disorganized and contains a collection of caseous tuberculous material (Figs. 780 to 783).

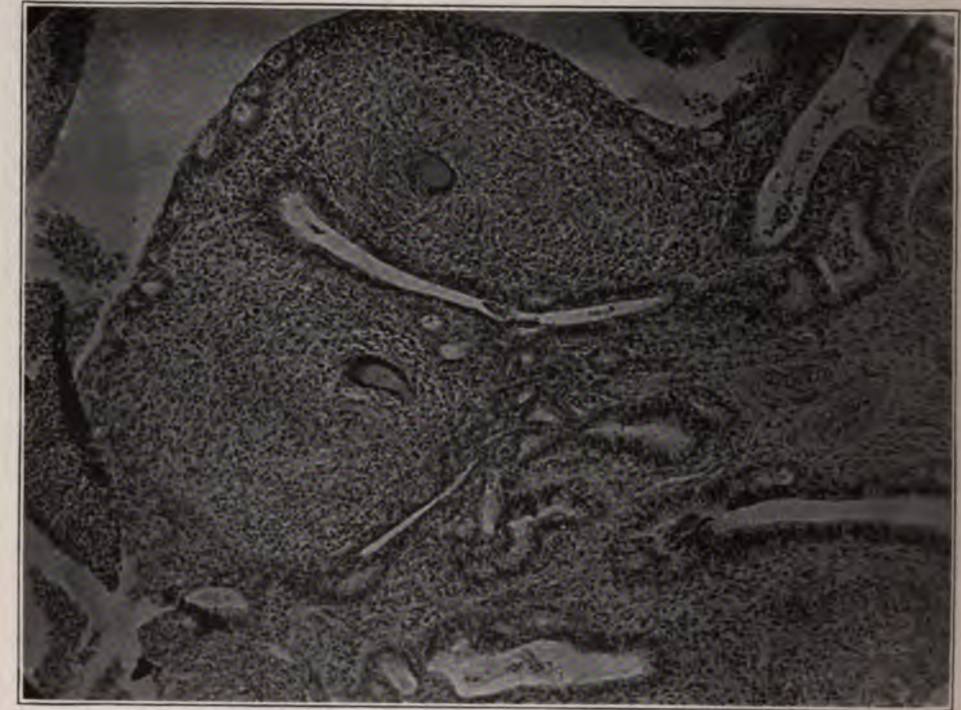


Fig. 782.—Tuberculosis of the tube. High power of the specimen in Fig. 781. Notice the typical tubercles containing giant cells. Gyn. Lab.

The appearance of the tube varies, of course, with the severity of the disease. In advanced cases the tube is greatly enlarged and on cutting it open the yellow broken-down material is seen—the so-called "caseous pus." This varies much in consistency, being in some cases rather thin and in others semisolid. When this is removed, the mucosa of the tube is seen to be studded with tubercles in all stages of breaking down, and there are also irregular, ragged ulcers, with small yellowish tubercles in their walls. Microscopic sections show the characteristic giant cells lying within typical tubercles, as well shown in Fig. 783.

When the peritoneal surface of the tube also is involved, it is studded with small tubercles and is usually adherent to some of the surrounding organs. Occasionally the tuberculous areas undergo calcification.

Tubal tuberculosis is also one of the common causes of general tuberculous peritonitis, a point of importance which will be further considered under treatment.

Pelvic tuberculosis has been found to be present in from 6 to 8 per cent of the cases of abdominal section for pelvic inflammation, but in only about a quarter of these is it so marked as to be easily recognized. In the remaining cases it is recognized only by microscopic examination of sections of the tube.

No period of life is exempt from genital tuberculosis. It has been found at all ages, from the infant of a few months to the aged woman past eighty. But the period of life in which it occurs most frequently is from the age of twenty to that of forty years; i.e., during the period of greatest sexual activity.

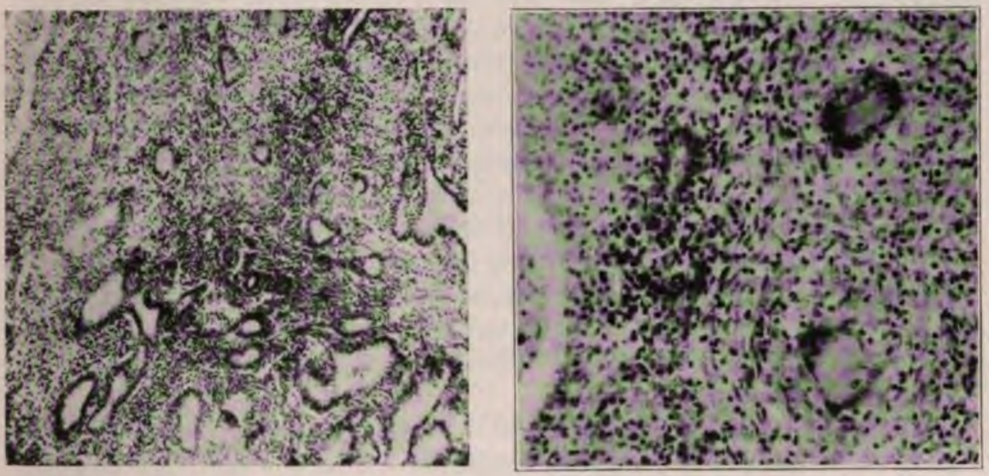

A. *B.*

Fig. 783.—Another view of tuberculosis of the tube. *A.* Field containing many tubercles and giant cells. *B.* High power of two giant cells, showing details. Gyn. Lab.

Symptoms and Diagnosis

The symptoms of pelvic tuberculosis are much the same as those of chronic pelvic inflammation. In fact it is a pelvic inflammation of a special kind. In a large percentage of the cases the diagnosis of tuberculosis is made only after the abdomen has been opened, the operation having been undertaken for what was supposed to be ordinary pelvic inflammation.

In not a few cases, however, a positive diagnosis of tuberculosis is possible before operation, and in some cases it is easy.

The conditions that point to pelvic tuberculosis are as follows:

1. Symptoms of chronic pelvic inflammation in a girl or young woman has had no evidence of uterine infection.

2. Gradual onset without previous uterine disease, and persistent progress without the periods of marked improvement usually present in ordinary pelvic inflammation.

3. Emaciation, gradual and persistent, without a corresponding severity of the inflammatory trouble.

4. Evidences of tuberculosis elsewhere. Most cases of pelvic tuberculosis occur in patients having pulmonary or intestinal tuberculosis.

5. Tuberculin reaction. In a doubtful case this may aid materially in the diagnosis. The injection method or the cutaneous test may be employed. The ophthalmic test is dangerous to the eye and had best be avoided.

Treatment

If there are no contraindicating lesions elsewhere, the affected tubes should be extirpated, preferably by abdominal section. The operation should be preceded and followed by antituberculous remedies and regimen.

If there are marked lesions elsewhere, or if the local trouble has advanced too far for radical operation, employ palliative measures. The palliative measures include the administration of antituberculous remedies internally, the drainage of fluid collections by operation and other measures mentioned under chronic pelvic inflammation.

In some cases of extensive peritoneal tuberculosis, an apparent cure has followed simple abdominal section. It is still a question why such a change for the better should sometimes follow the mere opening of the abdomen in these cases, but the fact that such results are secured has been demonstrated many times, and patients that are in suitable condition should be given this chance for improvement. The affected tubes, however, should always be removed when possible.

Pelvic tuberculosis often eventuates in general peritoneal tuberculosis. General tuberculous peritonitis can usually be traced to a tuberculous appendicitis, or to tuberculous salpingitis, or to tuberculous ulceration of the intestine. In operating for tuberculous peritonitis it is important to find and remove the focus if it can be done without too much traumatism. Mayo has done great service in insisting on this and in demonstrating the marked increase in the percentage of cures resulting therefrom.

EXTRAUTERINE PREGNANCY

Extrauterine pregnancy is pregnancy outside of the uterine cavity. With few exceptions the developing embryo is, in the beginning, located in the fallopian tube, consequently the term "tubal pregnancy" is applicable in most cases. The developing ovum may lodge in any part of the tube (see Fig. 784.

Etiology

The cause of extrauterine pregnancy is some interference with the downward progress of the fertilized ovum. The ovum and spermatozoa meet normally in the tube, and after fertilization the ovum passes along the remainder of the tube and into the uterus, where, having reached the trophoblast stage, it becomes attached and develops, constituting a normal pregnancy. Now, if the progress of the fertilized ovum is interfered with so that it remains in the tube and develops up to its trophoblast stage there, extrauterine pregnancy is the result. This interference with the downward progress of the ovum is usually due to some obstruction in the narrow proximal portion of the tube, though the obstruction may be situated anywhere between the ovary and the uterine cavity. The tubal obstruction must, of course, not be so marked as to prevent the upward progress of the spermatozoa; consequently extrauterine pregnancy is impossible when both tubes are completely occluded by inflammation or other process.

The conditions which interfere more or less with the downward progress of the ovum are as follows:

1. Mild salpingitis. Slight inflammation may lead to destruction of the cilia. The action of the cilia is supposed to be necessary to the normal progress of the ovum from the abdominal to the uterine end of the tube, the peristaltic action of the tube being of secondary importance and not sufficient in itself to carry the ovum along.

Again, such inflammation leads to swelling of the tubal mucosa and mechanical obstruction in the narrow portion of the tube. This obstruction, while not marked enough to prevent the upward progress of the active spermatozoa, may prevent the downward progress of the passive ovum.

2. Adhesions, from inflammation originating in the tube or elsewhere, may so distort the tube by bending or pressure as to partially obstruct its lumen.

3. Tumors within the tube wall or arising from other structures may by pressure narrow the lumen of the tube.

4. Malformations. Abel agrees with Freund that some of the spiral twists which are normally present in the tube in the embryo may persist to adult life and cause sufficient obstruction to lead to extrauterine pregnancy. Diverticula may lead off from the lumen of the fallopian tube. If a fertilized ovum lodges in one of these blind canals, tubal pregnancy will result. There may be also accessory tubes. These are usually connected to the normal tube, but sometimes by a cord only without any lumen. In such a case, if a fertilized ovum enters this accessory tube, it will remain there.

A rudimentary tube which is not open all the way to the uterus may be entered by an ovum which has been fertilized by a spermatozoa passed through the normal tube of the opposite side. The large fertilized ovum is stopped at the impervious portion of the deformed tube, and a tubal pregnancy is the result. Kelly illustrates an interesting case in which this same series of events occurred in a rudimentary uterine horn, the horn being so separated from the remainder of the uterus that it resembled part of the tube (Fig. 914).

Pathology

The fertilized ovum may lodge at any part of the fallopian tube, as shown in Fig. 784. When the ovum becomes attached to the tube wall, certain

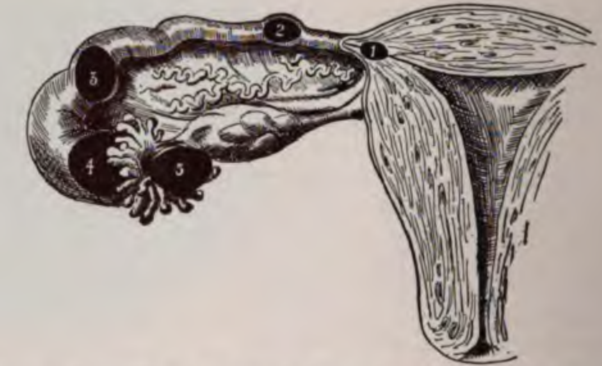


Fig. 784.—Diagram representing the sites for the various forms of tubal pregnancy. *1*, Interstitial pregnancy. *2*, Isthmial pregnancy. *3*, Ampullar pregnancy. *4*, Infundibular pregnancy. *5*, Tuboovarian pregnancy. (Gilliam—*Practical Gynecology.*)

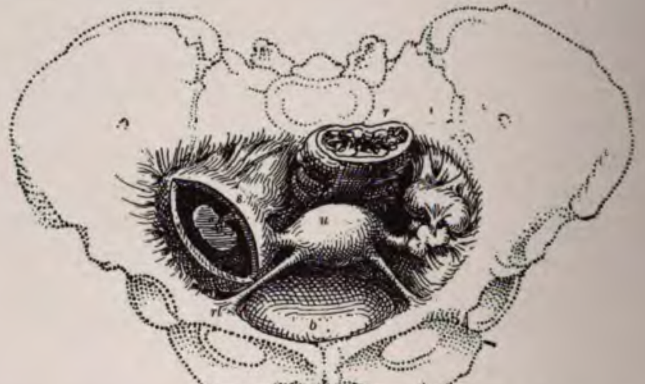


Fig. 785.—Tubal pregnancy in the right side. (Dickinson—*American Textbook of Obstetrics.*)

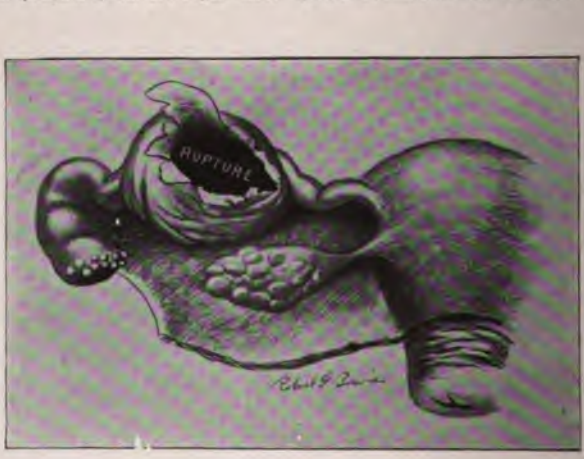


Fig. 786.—Tubal pregnancy, with rupture into the peritoneal cavity. (Gilliam—*Practical Gynecology.*)

changes begin. First, there is marked hyperemia, which leads to some swelling of the structures and to increased growth of all the tissue elements of the tube wall. In the mucosa in tubal pregnancy the stroma cells enlarge and become decidua cells, though they do not become so large or so closely packed together as in the uterine mucosa. There is some hypertrophy of the muscular tissue near the attachment of the ovum. Very soon there appear certain interesting changes that have a bearing on the early rupture of the pregnant tube. As the fetal elements reach into the tubal tissues, seeking nourishment, the wall of the tube becomes penetrated by cells of the trophoblast layer. These trophoblast cells work into the muscular layer of the tube and weaken it, and gradually penetrate all the way through the wall. This growth of fetal elements into and through the wall of the tube causes

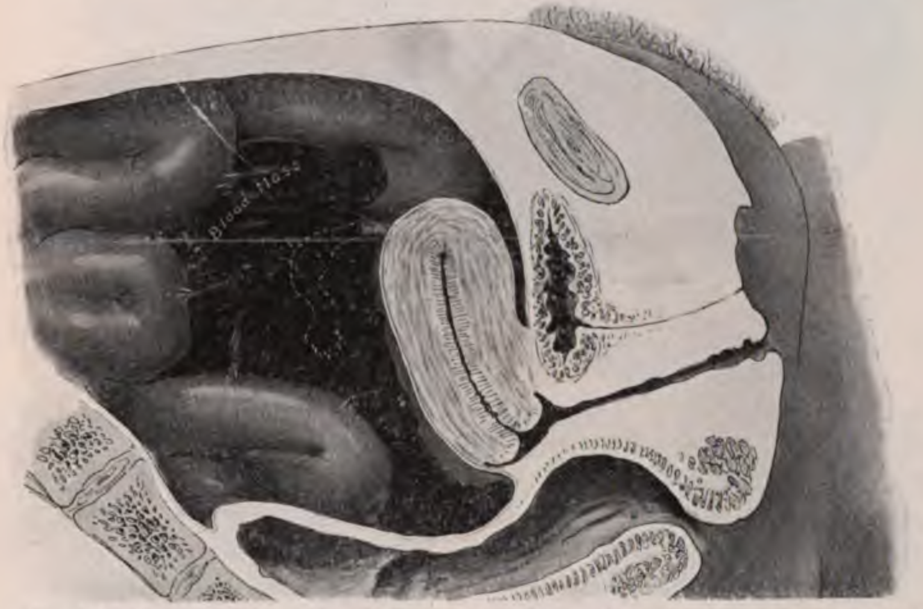


Fig. 787.—Blood mass about tube. Indicating the condition where there has been rupture of the tube, with repeated slight hemorrhages, resulting in a large mass of blood and exudate, which surrounds the tube.

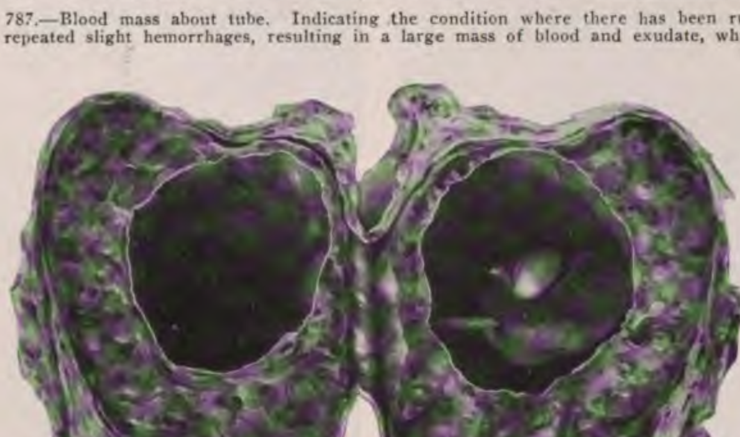


Fig. 788.—Specimen of early tubal pregnancy. The opened amniotic cavity shows the small fetus still in position. The tubal wall is thin, the area between it and amniotic cavity representing chorionic tissue destroyed by extravasated blood. Gyn. Lab.

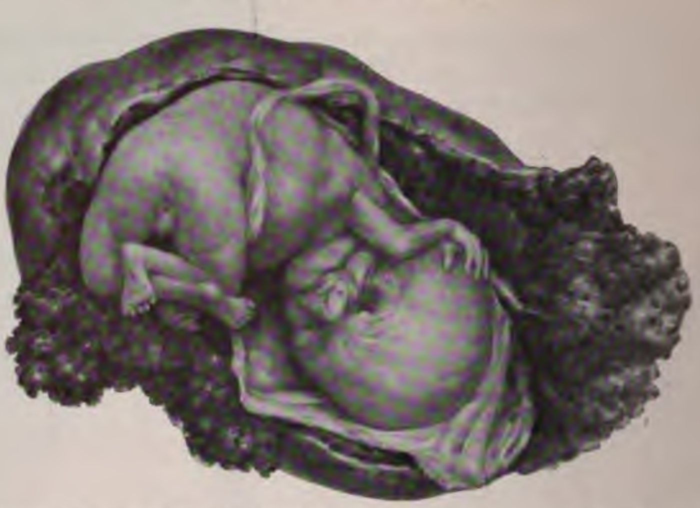


Fig. 789.—Specimen of tubal pregnancy farther advanced. Amniotic sac opened, chorionic tissue of normal appearance. Gyn. Lab.

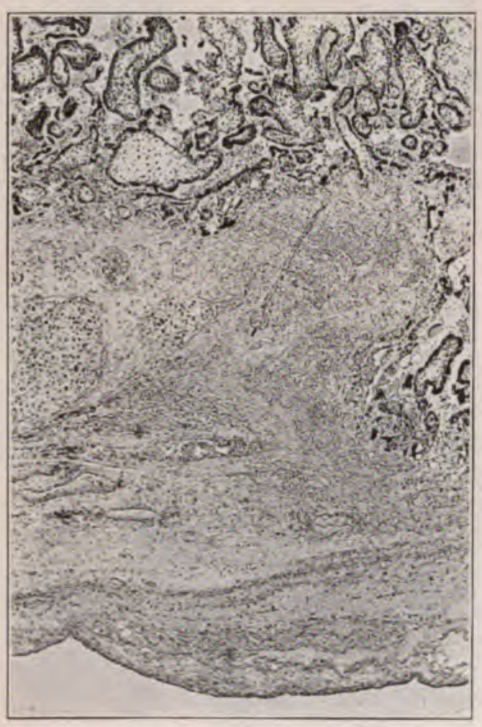


Fig. 790.—Tubal pregnancy. Section of wall and chorionic area, low power. Notice at the right how the tube wall is being penetrated. Gyn. Lab.

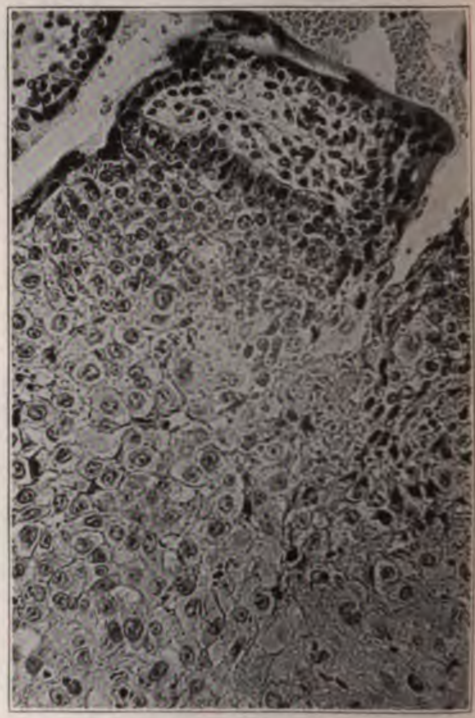


Fig. 791.—Tubal pregnancy, high power of Fig. 790, showing decidua cells and the attachment of chorionic villi. Gyn. Lab.

early rupture of the tube and serious internal hemorrhage (Figs. 785 to 798).

Pathologically and, in a measure, clinically, the cases may be divided into the following classes:

1. **Before Rupture.**—The developing embryo with its membranes is still completely surrounded by the unbroken tube.

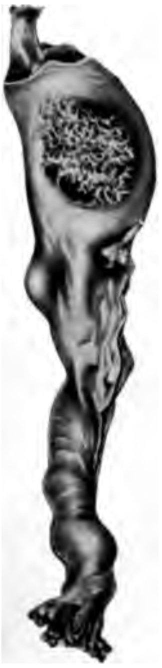


Fig. 792.—Tubal pregnancy. Drawing from a specimen with rupture near the uterine end of the tube. It is this location that ordinarily gives the sudden large hemorrhage. Gyn. Lab.

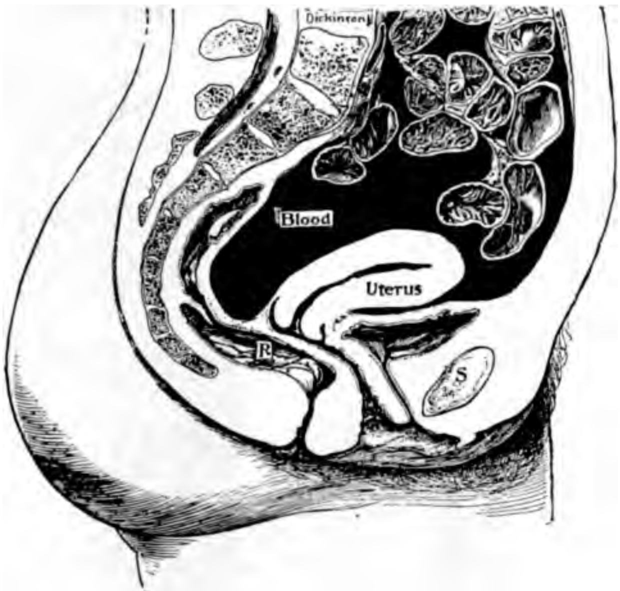


Fig. 793.—Tubal pregnancy with free intraperitoneal hemorrhage, showing a large amount of blood in the peritoneal cavity among the intestinal coils. This constitutes the "tragic" type, in which there is a sudden large hemorrhage and the patient goes into collapse. (Dickinson—*American Textbook of Obstetrics.*)

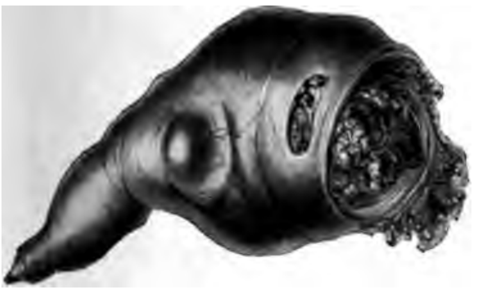


Fig. 794.—Tubal pregnancy, with abortion through the abdominal end of the tube into the peritoneal cavity. The end of the tube is dilated, but the structures have not yet been extruded. (Kelly—*Operative Gynecology.*)

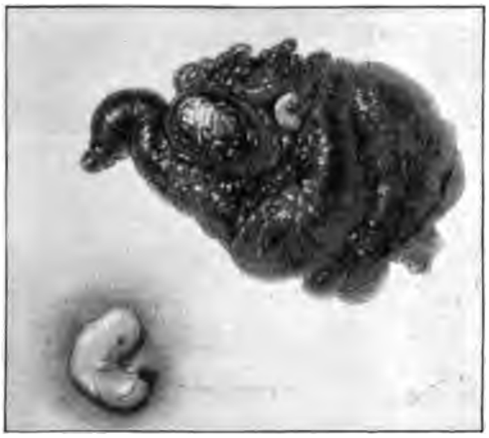


Fig. 795.—The clots, membranes and embryo extruded into the peritoneal cavity in the case of tubal abortion shown in Fig. 707. (Kelly—*Operative Gynecology.*)

2. **Intraperitoneal Rupture with Single Moderate Hemorrhage.**—The blood gravitates into the culdesac of Douglas. Adhesions bind together the structures above, thus forming a roof which shuts off the blood-filled culdesac from the remaining part of the peritoneal cavity. This condition is known as "pelvic hematocele" (Fig. 796). The blood may be gradually absorbed

without further disturbance or the hematocele may require drainage, as described under treatment. The very early embryo with membranes, having been completely cast off from its point of nourishment, perishes, and is usually absorbed without causing further trouble.

3. **Intraperitoneal Rupture with Repeated Moderate Hemorrhage.**—The membranes usually remain partially attached within the broken tube, and hence the extruded embryo continues to grow, causing trouble later. The first hemorrhage leads to peritoneal exudate, with resulting adhesions, which bind together adjacent structures. Thus the blood mass and broken tube and growing embryo are surrounded by a wall of exudate and adherent intestine.

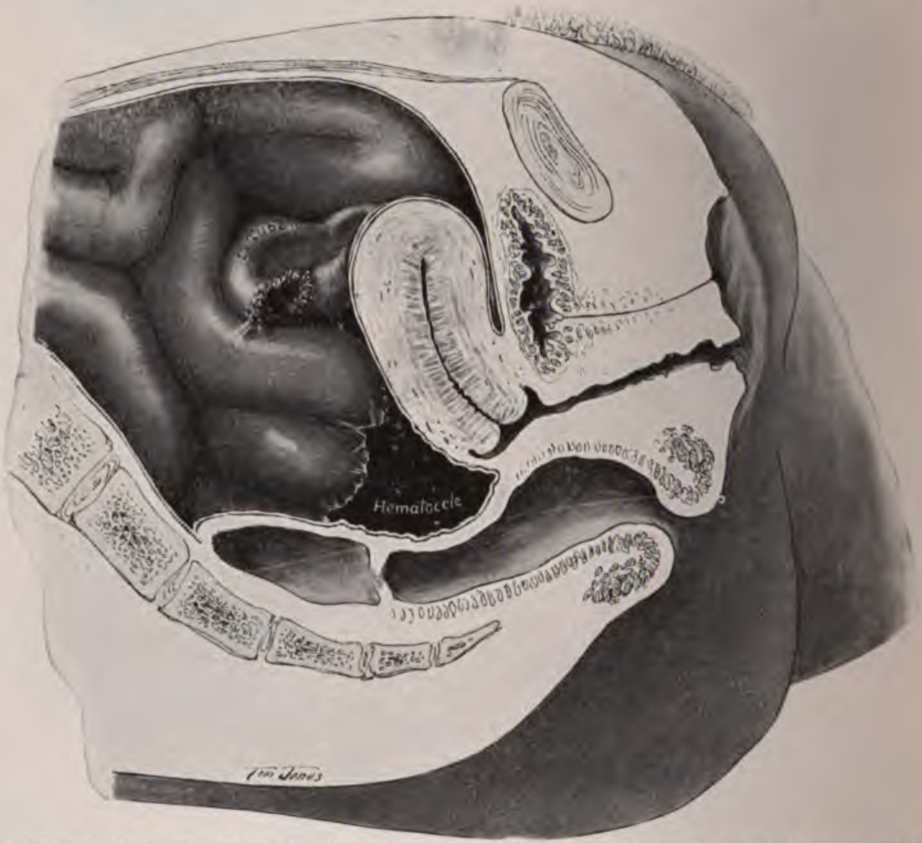


Fig. 796.—Pelvic hematocele. Indicating the condition where there has been a tubal abortion and the blood from it has gravitated to the culdesac and become surrounded by exudate.

This wall lessens the danger temporarily. But after a few days or a few weeks the continued growth causes further rupture of the tube or of the other limiting tissues, with accompanying fresh intraperitoneal hemorrhage of small or large amount. More exudate is then thrown out about the new blood mass, lessening the danger for a time. This process may be repeated many times within the course of a few months, provided the patient does not in the meantime succumb to hemorrhage or peritonitis. Thus there is found in this class of cases a gradually increasing mass (Fig. 787), accompanied by frequent attacks of pelvic pain and marked soreness. This class includes the majority of cases of extrauterine pregnancy that come to operation. Whether or not the patient's color and pulse are much affected depends upon the severity of the hemorrhages. In many cases the recurring pain and soreness are the most evident features, and at the bedside such cases are often mistaken for ordinary pelvic inflammation.

4. **Intraperitoneal Rupture with Profuse Hemorrhage.**—There is a free rupture of the tube (Figs. 792, 793), and blood pours out into the peritoneal cavity rapidly and in great quantity. It extends among the intestines and in some cases practically fills the abdominal cavity, as indicated in Fig. 793. The patient at once passes into a condition of severe shock. She is blanched, almost pulseless and, with the air-hunger and extreme pain, presents a most distressing picture. The cases of this class have been fittingly designated as the "tragic" cases. This severe and persistent hemorrhage is most likely

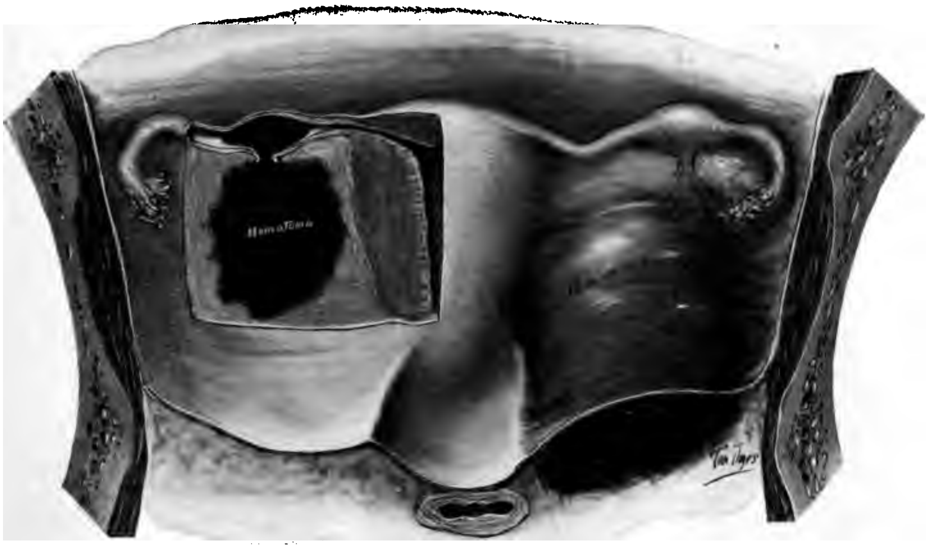


Fig. 797.—Hematoma. In the left broad ligament is indicated a small hematoma from rupture of the tube. In the right broad ligament is indicated a much larger hematoma.

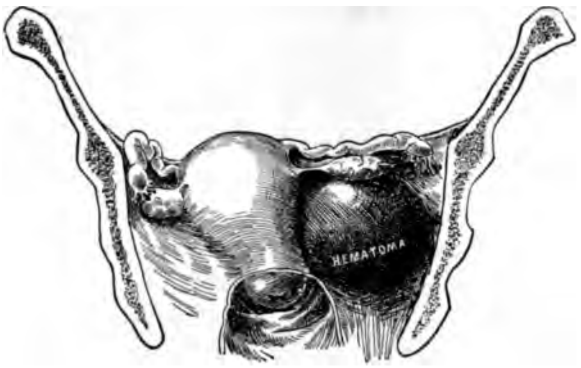


Fig. 798.—Hematoma of right broad ligament. (Montgomery—*Practical Gynecology*.)

to occur when the developing ovum is situated near the uterus, in that portion of the tube known as the "isthmus." In the vast majority of cases the bleeding ceases when the patient passes into complete shock, which is Nature's provision for checking the hemorrhage. In exceptional cases, however, the patient does actually bleed to death, either from the first free flow or from a renewal of the bleeding due to vomiting, bowel movement, sitting up or other disturbance of the newly formed clot.

5. **Tubal Abortion.**—If the place of lodgement of the fertilized ovum happens to be near the outer end of the tube (Fig. 794), the resulting enlargement of the lumen of the tube by the developing embryo opens the end of the tube, and the embryo with its membranes is likely to be extruded from the end of the tube into the peritoneal cavity. This is called "tubal abortion" (Figs. 794, 795, 796). Tubal abortion is accompanied with more or less intraperitoneal bleeding and gives rise to practically the same symptoms as tubal rupture, except not usually so severe. A considerable proportion of cases of supposed tubal rupture are really cases of tubal abortion, particularly those resulting in pelvic hematocele or a slight mass higher about the tube.

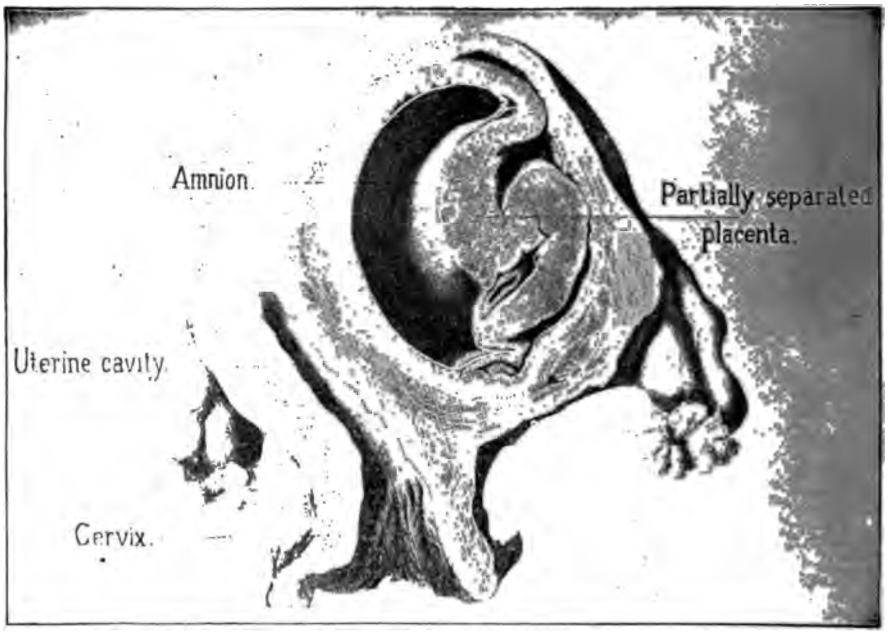


Fig. 799. Interstitial pregnancy. (Williams, after Bumm—*Obstetrics.*)

6. **Rupture into Broad Ligament.**—When the break in the tube wall takes place between the layers of the broad ligament, the hemorrhage is into the connective tissues of the pelvis—forming a "hematoma," as shown in Figs. 797 and 798. The hemorrhage may be moderate, forming a hematoma in one broad ligament, or it may be severe, forming a hematoma which gradually extends until it fills most of the connective tissue space in one or both sides of the pelvis. If the extruded embryo continues to grow in the broad ligament, then arises the condition designated as "broad ligament pregnancy."

7. **Interstitial Pregnancy.**—When the ovum lodges and develops in the interstitial portion of the tube (Fig. 418), the resulting condition is known as "interstitial pregnancy." This is peculiar in that the development takes place within the wall of the uterus, though outside the uterine cavity (see Figs. 799, 800). In this form of tubal pregnancy, rupture of the gestation sac usually does not take place until much later than with the ordinary form. Also, the rupture may in some cases be into the uterine cavity. Consequently there is a possibility of this form of tubal pregnancy terminating as a normal (intrauterine) pregnancy. Interstitial pregnancy in the early stages approaches in symptoms and signs very close to normal pregnancy, and hence presents more difficulties in diagnosis than a pregnancy farther out in the tube. It is difficult and sometimes impossible before operation to distinguish between interstitial pregnancy and pregnancy in a rudimentary horn of the uterus (cornual pregnancy). The latter is an intrauterine pregnancy in an abnormally shaped uterus and does not belong to the affection now under consideration (extrauterine pregnancy), though it may require the same operative treatment.

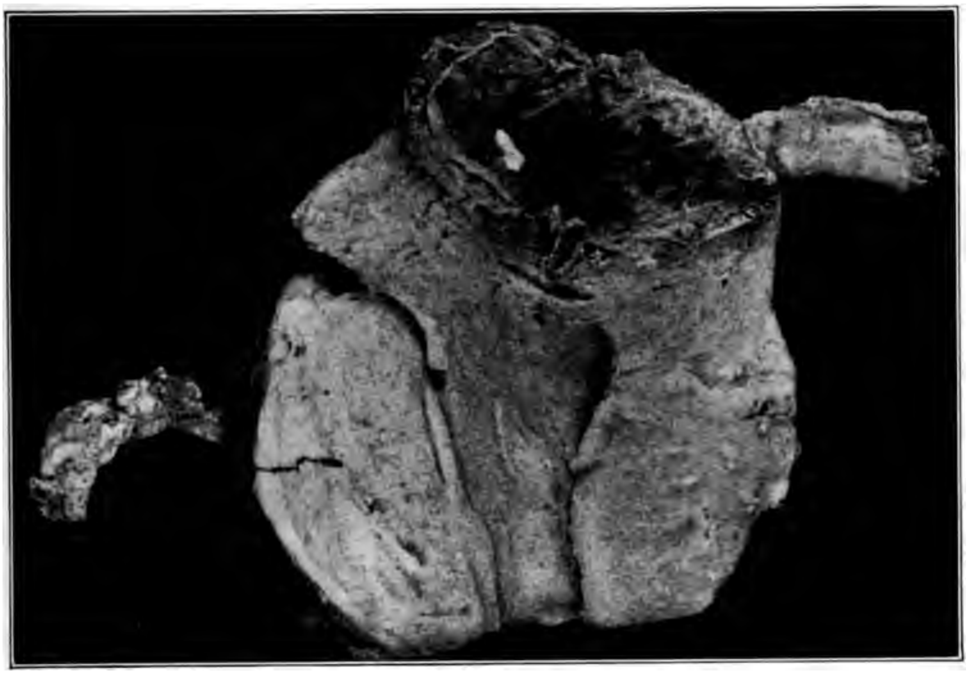


Fig. 800.—Ruptured interstitial pregnancy. (Farrar—*Am. Jour. Obst.*)

8. **Ovarian Pregnancy.**—If the developing ovum is found within the ovary, it constitutes "ovarian pregnancy," of which a few well-substantiated cases have been reported.

9. **Wandering Pregnancy.**—If the pregnancy is found in the peritoneal cavity without any apparent connection with the tubes, or uterus, or ovary, it is called a "wandering pregnancy," after the manner of designating fibroids which have lost their connection with the uterus. Such a pregnant mass

(fetus and surrounding membranes) may be attached to and receive blood supply from various structures. In an interesting case reported by Tuholske the placenta was attached to the liver, creating a most serious condition. "Abdominal pregnancy" is a general term which has been used to designate cases of pregnancy developing in the peritoneal cavity, with or without connection with the tube or ovary.

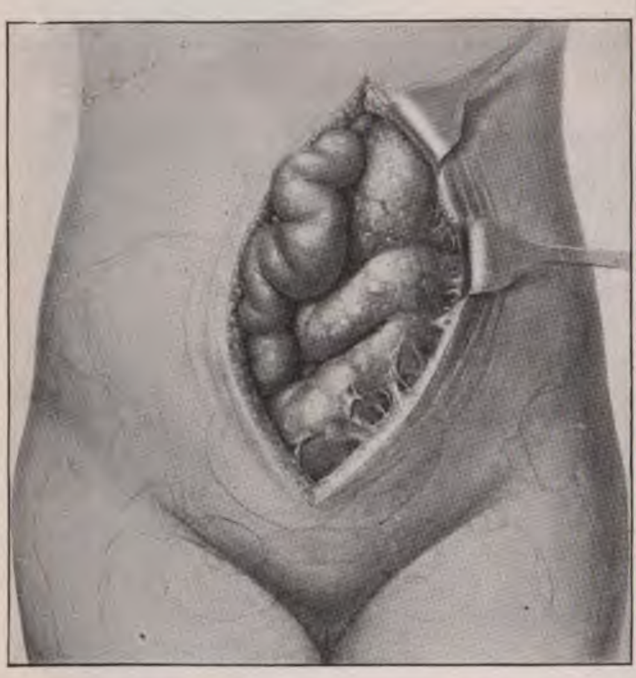


Fig. 801.—Extrauterine pregnancy with lithopedion. Showing the lithopedion in situ. (Kelly—*Operative Gynecology*.)

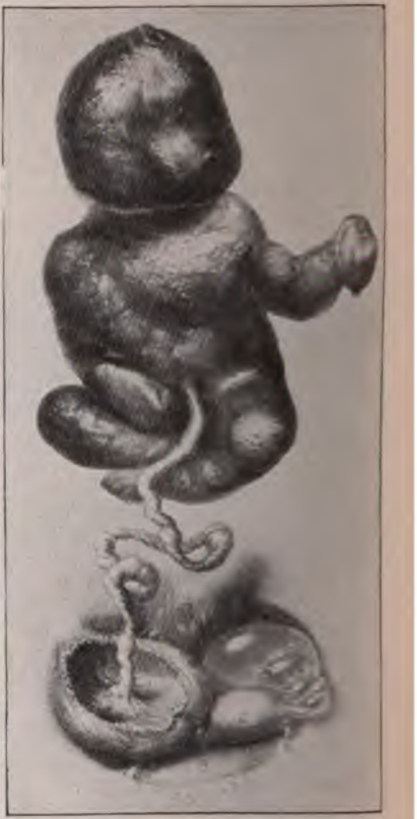


Fig. 802.—Showing the lithopedion removed, and also the site of the tubal pregnancy. (Kelly—*Operative Gynecology*.)

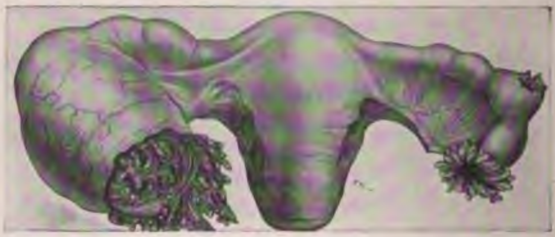


Fig. 803.—Bilateral tubal pregnancy. Drawing showing the conditions found at operation. Pregnancy near the middle of one tube and at the outer end of other, both ruptured. (Findley—*Surg., Gynec. and Obst.*)

10. **Extrauterine Pregnancy Carried to Near Term.**—The fetus may de-

velop to term or nearly so. The embryo and membranes remain attached to the tube and derive nourishment there, and the fetus develops in the peritoneal cavity almost the same as in the uterus. Again, the embryo and membranes may be extruded entirely from the tube and find attachment to some adjacent structure, from which nourishment is derived, or to some distant structure—for example, the liver, as in the case above mentioned. In this class of cases, if the patient survives long enough and the fetus continues to grow to term, false labor pains come on and the child dies, and it then constitutes a foreign body in the abdomen. This may lead to peritonitis and death of the mother, or the dead child may become somewhat encapsulated and remain for months or years, constituting a "lithopedion." Figs. 801 and 802 show such a case. In several instances of extrauterine pregnancy carried to near term the child has been saved alive by operation. Occasionally bilateral tubal pregnancy occurs (Fig. 803), and simultaneous occurrence of extrauterine and intrauterine pregnancy has also been reported.

Symptoms and Diagnosis

Before Rupture.—The first rupture of the tube with slight bleeding takes place within a few weeks after the lodgement of the fertilized ovum. Previous to this primary rupture the symptoms are practically those of an early pregnancy. The patient goes over her menstrual time without the menstrual flow appearing. There is some nausea, usually most marked in the morning, and perhaps some tenderness of the breasts. Pain is not necessarily present. There may be some soreness in the pelvis, either general or localized to one side, but this is rarely troublesome enough to arouse suspicion of anything abnormal, for some soreness through the pelvis is very common in normal pregnancy owing to the marked congestion and the enlarging uterus.

Pelvic examination at this stage shows some tenderness about the adnexa of one side, and perhaps a small mass, due to the enlargement in the tube. However, the normal ovaries are usually tender, especially when congested, as in early pregnancy, and the tenderness is frequently more marked on one side. The small mass in the tubal region is really the only positive evidence of any abnormal condition within the pelvis, and as far as known this mass may have been there for a long time, due to some previous trouble. Unless a previous examination has shown the pelvis to be clear, making it certain that the little mass is of recent development, the diagnosis of tubal pregnancy is hardly justified, for there is not sufficient evidence to establish it. A diagnosis based upon such insufficient evidence will prove erroneous in the great majority of cases, as has been amply demonstrated by the operative results from such hasty diagnoses. In exceptional cases the soreness will be so well localized to one side and so marked, particularly on exertion, and the tenderness of the little mass so very pronounced on palpation, in a patient previously perfectly well, that a diagnosis of tubal pregnancy with operation for the same before rupture may be safely made. But such cases are very rare, the conditions so closely simulating normal pregnancy that no suspicion of abnormality is aroused, or, if aroused, the examination signs are not positive. It seems probable that a large proportion of the cases set forth as diagnosed and operated on "before rupture" are really not seen until after the primary rupture. There may not be much disturbance from this first rupture, only a very slight hemorrhage taking place. But this is sufficient to give the few sharp pains, and the persistent soreness, and the markedly tender mass without apparent cause—the three symptoms that occupy such an important place in the diagnosis of tubal pregnancy after rupture.

Be careful (1) to make a pelvic examination in every case of early pregnancy in which there is sufficient pain or soreness in the pelvis to arouse suspicion of some abnormality, (2) to make no positive diagnosis of tubal pregnancy unless the physical signs justify it, and (3) to pronounce no case "before rupture" which shows blood in the pelvis, or recent plastic exudate and adhesions about the tube, or damage to the peritoneal coat of the tube at the time of operation.

Rupture with Repeated Moderate Hemorrhages.—In the majority of cases tubal pregnancy after the primary rupture presents the symptoms and signs of ordinary acute or subacute pelvic inflammation (salpingitis), but with certain peculiarities.

Suppose that you are called to see a patient with pain in the pelvis and lower abdomen, and a tender mass beside the uterus or behind it. Is the trouble ordinary pelvic inflammation or is it tubal pregnancy with resulting inflammation?

As ordinary pelvic inflammation, in the form of salpingitis, is the more common affection, it is to be assumed that the trouble is ordinary pelvic inflammation and not tubal pregnancy, unless there are special symptoms pointing to the latter. The **special symptoms** pointing to tubal pregnancy (but not pathognomonic of it) are as follows:

1. **A Missed Menstruation.**—The patient, previously regular in her menstruation, fails to come unwell at the proper time. She goes overtime a few days or a week, or several weeks.

2. **Sudden Onset of Pain.**—After going overtime for a few days or a few weeks, the patient is suddenly seized with pain in the pelvis, usually severe enough to confine her to bed, and in exceptional cases she is completely prostrated and in collapse.

3. **Bloody Vaginal Discharge.**—Usually within a few days of the onset of the pain a blood-stained vaginal discharge appears. The patient regards this as the return of the menstrual flow. But generally it is not so free as the regular menstrual flow, and does not stop in a few days as the menstrual flow should, but persists as an irregular bloody discharge for a week or two—some days present and other days absent. In some cases there are shreds of membrane and blood clots in the discharge, leading to the supposition that a miscarriage has taken place.

4. **Only Slight Fever.**—The temperature may go up to 102° or even higher at the onset of the trouble, but after that it usually ranges about 100° and may go to normal. The absence of marked fever is one of the strong

points in distinguishing tubal pregnancy from early abortion, with persistent bloody discharge and infection and salpingitis.

5. **Evidence of Internal Hemorrhage** will, of course, vary with the amount of blood lost internally. If the internal hemorrhage is free, the patient may be in collapse within a few minutes after the onset of the pain. In other cases the internal bleeding is so slight as to produce no effect on the patient's pulse or color—but it causes pain.

6. **Exacerbations of Pain without Apparent Cause and without Decided Elevation of Temperature** is characteristic of those cases of tubal pregnancy in which there are repeated slight internal hemorrhages.

In salpingitis, with the patient quiet in bed, such exacerbations of pain could be caused only by an increase in the inflammatory process, and this would be accompanied by a decided rise in temperature.

7. **Signs of Pregnancy.**—Some of the early signs of pregnancy may be present—for example, stomach disturbance, or pain in the breasts, or softening of the cervix uteri. The serum test of Abderhalden may be helpful.

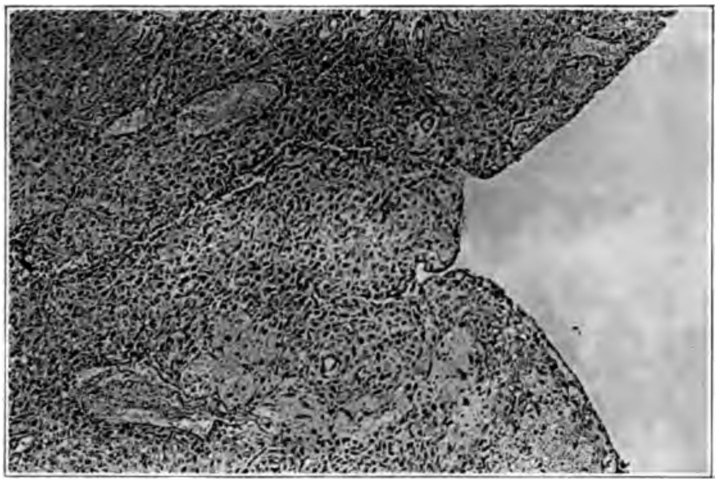


Fig. 804.—Microscopic appearance of the endometrium in a case of tubal pregnancy. Compact portion showing typical decidual cells, but no fetal elements. Gyn. Lab.

8. **Absence of Intrauterine Pregnancy.**—It may be very difficult to determine, in a given case, whether the trouble is tubal pregnancy with slight hemorrhage, or an incomplete abortion with persistent bleeding and mild sepsis and salpingitis. In such a doubtful case the uterus may be cleared out with the curet and the scrapings examined. If there has been recent pregnancy within the uterus, the microscopic examination of the tissues removed will show chorionic villi. If the trouble is tubal pregnancy, there will be no fetal structures in the scrapings (Fig. 804).

This procedure is somewhat dangerous, for, if tubal pregnancy be present, a fresh hemorrhage and a serious one may be started by the manipulations. Consequently, curettage should be employed in these doubtful cases only when serious symptoms make a positive diagnosis necessary at once. In a case the operator should have arrangements made so that immediate abdominal section may be carried out should threatening symptoms indicating internal hemorrhage arise during the process of curettage.

Usually in tubal pregnancy the internal hemorrhage is not severe at first, and there may be a number of these slight hemorrhages at intervals of a few days or a few weeks. The hemorrhages are not severe enough to affect the patient's pulse appreciably. They cause only pain and the evidences of pelvic inflammation. The symptoms and diagnosis in this class of cases are well shown by the following typical case:

Patient thirty-seven years of age. General health good. Had one child seven years ago. No pregnancy since. Never had any uterine or pelvic trouble. Menstruation was regular, every twenty-seven days, until about two months before I saw her. The last regular menstruation occurred December 3. The flow was in every way normal and at the right time. December 30 was the time for the next flow to appear, but it was missed entirely. The patient felt well and there was no reason why the menses should stop, aside from pregnancy. There was some nausea, the breasts began to enlarge and were somewhat painful, and the patient supposed herself pregnant. She felt well up to January 26. That was the day for her menses to appear, supposing she had not missed. The previous day she had been doing extra work, but slept well. In the morning she arose and went about her usual household duties, feeling well. About 8 a. m., while still engaged with her light work, she was seized with a sudden severe pain in the pelvis. The pain was intense. She managed to get to the bed and threw herself across the foot of it. Her physician was called and found it necessary to give morphine and to repeat it. This, of course, relieved her very much, but still the least change of position increased the pain and not until evening could she be moved enough to remove her dress and arrange her in bed. Her temperature was then 102°. In questioning her later, no history of shock could be obtained. The patient did not remember having felt particularly weak or faint or nauseated—she noticed only the severe pain.

Morphine and other preparations of opium were continued in small doses occasionally for several days. Hot stupes were applied to the lower abdomen and frequent doses of salts were given to relieve the constipation. The pain and soreness gradually became less. The temperature varied from 101° to 99°. On the third day a bloody vaginal discharge appeared. This was not like the menstrual flow, but was scanty and irregular. It continued a few days and then stopped. There were no membranes or large clots noticed. In about a week the patient was feeling so much better that she sat up for an hour or two. The pain then reappeared and she was obliged to return to bed. More or less pain and soreness through the pelvis continued, and this time she remained in bed ten days. There was more vaginal discharge, but it was not profuse or irritating. It was occasionally streaked with blood. After ten days in bed she felt so well that she sat up in a chair for a short time. No disturbance following this, she sat up the next day a little longer. After five days she walked out to the dining room and helped about the table. She had then been free from pain for several days. The next day, however, the pain returned. It was not severe, but she remained in bed. The following morning the pain was worse, and the author was then called in consultation—about three weeks after the beginning of the attack. The patient was confined to her bed with pelvic pain and decided tenderness over all the lower abdomen. Good pulse, good color, temperature 99°.

On vaginal and bimanual examination there was marked tenderness all about the uterus. In the right tubal region there was a small hard mass about the size of the ovary, but much harder and not movable. In the left tubal region there was a larger, softer mass, which apparently occupied nearly all the left side of the pelvis. It was so soft that the borders were not distinct. Both masses were situated rather high, and there was so much tenderness that they could not be accurately outlined. There was no exudate in the culdesac of Douglas. There was a slight vaginal discharge streaked with blood.

Taking into consideration the history of the case and the findings on examination, a diagnosis was made of tubal pregnancy, with rupture three weeks previously and repeated slight hemorrhages since. It was not clear which tube the pregnancy was in, for there was a tender mass on each side of the uterus.

It was advised that the patient be brought to the city at once for operation. You may think that rather risky advice for a case of ruptured extrauterine pregnancy, but it seemed clear that the focus of disturbance was well surrounded by plastic exudate, and that a trip on the train with the patient flat on the stretcher all the time would not be attended with much risk, particularly in view of the fact that she had already been up and walking about. The author had gone to the town prepared, of course, to do whatever was necessary at the house, but concluded that the increased safety of the operation in a hospital outweighed the danger of the trip. The trip to the hospital caused no particular disturbance. When the abdomen was opened, blood clots and adhesions about the left tube were found. The outer part of the tube was enlarged to the size of a lemon and contained the fetus and membranes still attached. The situation of the mass of blood clots and exudate was rather unusual. It was principally in front of the uterus, over the bladder. The small mass in the right side had no connection with the tubal pregnancy. It was the right ovary surrounded and bound down by adhesions. After the left tube and ovary had been removed and the mass of blood clots cleared out, the right ovary was freed from its adhesions and left in place. The patient recovered without incident.

In this case there was no evidence of sudden profuse loss of blood, and from personal observations the author is inclined to the opinion that this holds good in a large majority of cases of extrauterine pregnancy.

Rupture with Profuse Hemorrhage.—In exceptional cases there is a sudden loss of a large amount of blood into the peritoneal cavity. In such a case the symptoms are striking and urgent. The patient's face is blanched, her nose and forehead and fingers are cold, the pulse is rapid and weak and failing, a cold sweat appears on the face, respiration is short and labored—and over all is the intense pain, which is due to the blood spreading through the peritoneal cavity, and of which the patient complains as long as she has sufficient strength. These are desperate cases. This sudden profuse hemorrhage may appear with the first attack of pain, or the first hemorrhage may be slight, the severe hemorrhage taking place after several hours or several days. The following case, from the author's records, gives a practical idea of the clinical features of the cases of this class:

About nine o'clock one morning the author was called by telephone to see a woman who, the message stated, was having severe pain in the abdomen. When he reached the house the pain had diminished considerably, but was still very troublesome. It was diffuse throughout the lower abdomen and was accompanied by marked tenderness over the same region. The abdominal muscles were tense. Movement of the patient in the bed or jarring of the bed increased the pain. Patient's color was good. Temperature was 99°. Pulse was 76, full and regular. There was a bloody vaginal discharge, which had appeared the day before and which the patient thought was her menstrual flow a few days delayed.

The history obtained was that the patient's previous health had been good, that menstruation had been regular (about every 28 days) and painless. Nothing out of the ordinary was noticed until one week before. It was then her time to menstruate, but the flow did not appear. She thought nothing of this, as she occasionally went a few days over time. She felt well and there was no nausea or other indication of pregnancy. In a few days a bloody flow appeared. This was not so free nor so dark as the regular monthly flow. But the patient supposed it to be the menstrual flow, and she continued to attend to her household duties without discomfort.

The morning of the attack she had been superintending her household work as usual. While standing by a table she was seized with severe pain in the lower abdomen. She was lifted to a chair, the pain became less, and she ate breakfast. In an hour the pain had almost disappeared and she went upstairs, and felt very comfortable while sitting reading. She felt a desire to go to stool and during the bowel movement the pain returned with increased severity, so that she had to be helped to her room.

When the author saw the patient, about an hour later, she was in good general condition, as already explained, and with no decided symptoms except the abdominal tenderness and pain on movement.

Vaginal examination showed the uterus slightly enlarged and softened, and the whole interior of the pelvis very tender. The least movement of the uterus caused pain. The pelvic tenderness was so marked that satisfactory bimanual examination was not possible. No mass could be felt to either side of the uterus nor behind it. The cervix was closed. The marked and widespread tenderness in the pelvis and lower abdomen showed there was something more serious than a simple miscarriage, which the patient had concluded was the trouble. The sudden onset of intense pain, with complete absence of previous disturbance and without fever, excluded peritonitis due to inflammation of the tubes or appendix. There was no evidence of intestinal obstruction, or volvulus, or intussusception. The pain and hyperesthesia were not due to any drug habit, for the patient had no such habit. The diagnosis of extrauterine pregnancy was fairly clear, in spite of the fact that no pelvic mass could be located. It was deemed advisable to get the patient to the hospital before operating, and, as the first hemorrhage had evidently been slight, it was thought that by keeping her perfectly quiet for a day or two she could be safely moved. Orders were given accordingly.

The spontaneous pain in the lower abdomen subsided and the tenderness gradually diminished. By evening the patient was comfortable when perfectly quiet. The next morning the patient was much improved and was feeling comfortable—so comfortable that she did not consider herself very sick, and did not take kindly to the injunction to lie quiet in the bed and on no account to rise up. That afternoon the pain returned to some extent, but it was not severe, and nothing was seen to indicate that the patient would not be in good condition the next morning for the trip to the hospital, where a room had already been engaged for her. But near midnight a message was received that the severe pain had returned and that the patient was short of breath. Hurrying to the house the author found the patient in collapse. The pulse was small and rapid, the features were blanched and pinched—the greatest possible contrast to the rosy, robust appearance which she presented a few hours before. The extremities were cold, and a cold perspiration stood out on the face. Dyspnea was present, but the patient complained only of the intense abdominal pain, which seemed to be increasing. The hemorrhage was still going on, as evidenced by the increasing widespread pain and the continued failing of the pulse. By the time the hasty preparations for the necessary operation were completed, the pulse was thready and at times scarcely perceptible. The patient remarked afterwards that she believed she was dying, as she could feel the chill on the extremities creeping closer and closer towards the trunk.

When preparations were completed, the patient was etherized and the abdomen opened. The peritoneal cavity was full of blood. The ruptured tube was quickly located by touch and clamped. That stopped the bleeding temporarily. The principal part of the blood was then cleared out of the abdomen, the affected adnexa removed, the peritoneal cavity flooded with hot normal saline solution and the abdomen closed. The patient was almost pulseless and continued in that condition for 40 hours in spite of all stimulating means. Good reaction then gradually came on and the patient improved rapidly and made a perfect recovery. Subsequently the patient stated that late in the afternoon before the nearly fatal hemorrhage she was feeling so well that she sat up in bed to take nourishment and to chat with friends, regarding the strict admonition to keep perfectly quiet on her back, as "overcautious."

Differential Diagnosis

This subject is of interest to every one called to make a diagnosis in acute abdominal affections, for in many cases diagnosticated and operated on as tubal pregnancy the operation revealed that the trouble was not tubal pregnancy, but some entirely different affection. There are many conditions that may simulate one or more of the principal symptoms of extrauterine pregnancy, and these must be taken into consideration in the differential diagnosis.

The cardinal symptoms of early tubal pregnancy are (1) a missed menstruation, (2) sudden onset of pain (with or without shock), (3) bloody vaginal discharge, (4) a tender mass beside the uterus, (5) only slight fever, and (6) exacerbations of the pain and enlargement of the mass without corresponding elevation of temperature. In atypical cases there may be decided fever or onset of pains without missed menstruation or other variations from the rule. Again, the internal hemorrhage may be very severe at first, requiring a diagnosis at once before the appearance of later confirmatory evidences. It may be impossible to feel a mass, for the liquid blood itself gives no well-marked resistance and yet causes so much tenderness that the enlarged tube cannot be satisfactorily palpated. Freshly coagulated blood gives a bogginess, but not a distinctly outlined mass. After a short time there develops a distinct mass, due to the fibrin and adhesions and infiltration associated with the blood clot.

The difficulties of differentiation are due largely to the fact that many cases of extrauterine pregnancy are atypical in symptomatology—presenting some of the prominent symptoms, but lacking others. Now, there are other affections that may present two or three of the prominent symptoms of tubal gestation, and if the distinguishing characteristics of the other affection happen to be absent or obscured, a mistake in diagnosis is probable. Space will not permit consideration of all the conditions that may simulate tubal pregnancy; only a few of the more common ones may be discussed. These may be grouped into two classes—first, those conditions in which the principal feature is a tender pelvic mass, associated with some of the other symptoms of tubal pregnancy, and, second, those conditions in which the principal feature is sudden abdominal pain and collapse without apparent cause; i.e., without the disturbances that usually precede or accompany collapse from other diseases.

From a rather extensive experience with the deceptive conditions that cause mistakes in the diagnosis of tubal pregnancy, the author draws the following conclusions:

1. Gonorrheal pyosalpinx, after the acute symptoms subside, may lie dormant and unsuspected for a long period (four years in one reported case). During this quiescent period the pus tube (containing sterile pus usually) is tolerated the same as a small tumor or other non-irritating body—the patient being practically well and without decided pelvic disturbance.

Such a quiescent pus tube may at any time give rise to an acute exacerbation, and the onset of the pain may be so sudden and apparently causeless as to suggest tubal pregnancy. This suggestion is strengthened by the continued enlargement of the mass (from irritative exudate) without decided fever (for the pus is sterile). Accompanying the exacerbation or preceding it there are sometimes other symptoms that we associate with tubal pregnancy —viz., missed menstruation, stomach disturbance, tenderness of the breasts, and softening of the cervix uteri. The last three are accounted for by the peritoneal and periuterine irritation and congestion, but why there should be delayed or missed menstruation at this inopportune time is a mystery. One would suppose that the irritation and pelvic congestion would cause the menstrual flow to be excessive rather than absent. It is possible that the temporary suppression of menstruation (from some nervous disturbance or other obscure cause) stands in a causative relation to the acute exacerbation with its subsequent symptoms. This is offered simply as a suggestion toward a possible explanation of this strange misleading sequence of events (the missed menstruation followed by the other symptoms detailed).

In cases of supposed tubal pregnancy of the type mentioned, particular care should be taken to exclude chronic gonorrheal salpingitis, as follows: (a) by inquiring into the patient's history for evidences of specific vaginitis or urethritis, and for subsequent pelvic symptoms (an inquiry into the husband's history also may bring out valuable information); (b) by a careful examination for evidences of a chronic urethritis, Bartholinitis, endometritis or salpingitis; and (c) by staining for the gonococcus any suspicious discharge that may be obtained from the urethra, vulvovaginal glands, uterus or vagina. In chronic cases negative findings do not exclude gonorrhea, for the gonococcus disappears from the discharge after a time.

2. In rare cases acute gonorrhea may extend rapidly through the uterus to the tubes and peritoneum, with so little disturbance of the vagina and vulva as to arouse no suspicion of its presence. In such a case the acute peritoneal symptoms will come on suddenly and without apparent cause. If there happens to be also delayed or scanty menstruation, tubal pregnancy may be suspected. And this suspicion is strengthened by the stomach disturbance, the softening of the cervix and the enlarging mass beside the uterus. In a case above mentioned the diagnosis was further obscured by the curettage, which modified the discharge, and by the continued low temperature, which seemed to exclude acute inflammation. In all such doubtful cases with acute discharge it is advisable to examine for gonococci, even though the discharge be scanty and bloody and apparently nonpurulent.

3. An early miscarriage, if associated with a tumor or followed by mild salpingitis, may very closely simulate tubal pregnancy. Membranes may be passed in either condition. With a miscarriage there is an embryo, but it often passes unnoticed. If a shred of tissue is passed, it may be examined for chorionic structures. In a case which cannot be decided otherwise, curettage is advisable to obtain tissue for microscopic examination for chorionic villi. But in suspected tubal pregnancy such a curettage should not be carried out until the patient is in a hospital and prepared for abdominal section, for the manipulations may start internal hemorrhage, requiring operation at once.

4. A pregnant uterus may present very misleading conditions; e.g., irregular softening (so much so that the body seems to be a firm mass entirely separate from the cervix), displacement, backward or forward or laterally; hyperesthesia with displacement, or irregular softening or an associated lateral mass (salpingitis, etc.). If there is in addition an anomalous history, a mistake is quite probable.

5. An unsuspected tumor in the pelvis may give rise suddenly to severe disturbance, and if there happen to be present also some of the symptoms of early pregnancy, a diagnosis of extrauterine pregnancy is very probable. The reported cases demonstrate that the early symptoms of pregnancy (missed menstruation, stomach disturbance, breast tenderness and softened cervix uteri) often appear without satisfactory cause and at most inopportune times.

6. Ovarian hemorrhage or tubal hemorrhage, due to other conditions, may so closely simulate extrauterine pregnancy as to be indistinguishable before operation, and in some cases the matter is in doubt even after direct exposure and handling of the affected structures. In this connection there are three points to be kept in mind: (a) There may be slight hemorrhage from the tube or ovary, particularly at the period of menstrual congestion not due to extrauterine pregnancy and not requiring operation. (b) In cases of tubal hemorrhage requiring operation the hemorrhagic condition of the tube is not necessarily due to pregnancy, and in doubtful cases should not be pronounced such until after confirmation by microscopic examination. (c) In a hemorrhagic condition of the ovary requiring removal of the same, a careful examination should be made to determine exactly the pathologic condition. Such a supposed simple "blood cyst" of the ovary may prove on careful microscopic examination to be an early ovarian pregnancy.

7. Salpingitis, appendicitis and perforations in the gastrointestinal tract may in rare cases, come on so suddenly and progress so rapidly as to suggest internal hemorrhage from extrauterine pregnancy. Usually in these conditions there are preceding or accompanying symptoms which point to the true nature of the disease. If these distinctive features are absent and there happen to be some of the other symptoms of tubal pregnancy, a mistaken diagnosis is probable.

8. Fulminating pelvic edema, with its sudden onset and the rapid development of alarming symptoms, may closely resemble extrauterine pregnancy. In one case, cited later, the temperature was so high that it was easily distinguished as an inflammatory trouble and not a hemorrhage, but in other reported cases this feature was lacking and mistaken diagnoses of extrauterine pregnancy were made. In this, as in other conditions of nonhemorrhagic shock or depression, there is not the persistently blanched condition of the skin so characteristic of profuse hemorrhage. The pulse, also, though rapid, is likely to have better volume than after a severe hemorrhage.

9. It is evident that the diagnosis of extrauterine pregnancy must rest on the combination of several symptoms. No one fact is sufficient, and it is hazardous to depend on two or three facts unless they are especially strong and well marked. In most cases the diagnosis must be reached by a careful consideration of all the symptoms present and the definite exclusion, one by one, of other conditions which may produce similar symptoms.

Treatment

In pointing out the treatment for extrauterine pregnancy, several clinical classes must be considered—namely (1) before rupture, (2) hematocele, (3) repeated moderate intraperitoneal hemorrhage, (4) profuse intraperitoneal hemorrhage, (5) hematoma, and (6) advanced cases.

1. **Before Rupture.**—The only safe line of treatment in this stage is abdominal section and removal of the pregnant tube as soon as the diagnosis is fairly certain. The patient is in constant danger of a sudden serious hemorrhage, hence the sooner she is operated on the better. If the tube is lying low in the culdesac, it might be reached and ligated from below (vaginal section), but this is not an entirely safe undertaking. The manipulations may serve to start a sudden severe hemorrhage which could not be promptly checked from below, particularly as these pregnant tubes are frequently bound in place by old adhesions. The safest operation in this stage is removal of the pregnant tube by abdominal section.

2. **Pelvic Hematocele** (Fig. 796).—In these cases the hemorrhage has long since ceased and the collection of blood in the pelvic cavity is well shut off from the general peritoneal cavity by plastic exudate and adhesions. The embryo and membranes have probably escaped from the tube, either through a rupture in the wall or more frequently through the end of the tube by "tubal abortion," and perhaps have been largely absorbed.

Practically all that remains is the blood in the pelvis, with the exudate and adhesions around it. This forms a tender mass low in the culdesac back of the uterus, without much disturbance higher.

In such a case it is well to watch the patient for a while, in the meantime keeping her quiet in bed. In the course of a week or ten days there will probably be decided improvement, showing that Nature is taking care of the blood and exudate and that the patient will probably recover without operation, or renewed evidences of irritation will appear, showing that embryo and chorion are still growing or that the blood and exudate are acting as a persistent source of irritation. When there is persistent irritation after this period of rest, operation is indicated.

The choice of operation depends on the circumstances of the case. If the evidences of irritation (pain and tenderness) are all low in the culdesac, the possibility is that evacuation of the blood from the culdesac by vaginal section will be all that is necessary. If the pain and tenderness extend into the upper part of the pelvis, abdominal section is the safer operation. When the conditions are doubtful, the abdominal route should be chosen.

In a case where a hematocele is to be evacuated by vaginal section, the patient should be prepared for an abdominal section also, for there is a possibility of the vaginal manipulations starting an internal hemorrhage which could not be satisfactorily controlled from below.

3. **Repeated Moderate Intraperitoneal Hemorrhage** (Fig. 787).—This class

comprises the majority of the cases of tubal pregnancy. The usual course of such a case is well shown in the typical case described under symptomatology. The treatment is abdominal section as soon as the diagnosis is positive and the patient can be placed in a hospital and given the regular careful preparation for that operation.

4. **Profuse Intraperitoneal Hemorrhage** (Fig. 793).—In these cases immediate abdominal section is advisable as a rule if the patient is within reach of an experienced abdominal surgeon and can be placed in suitable surroundings. In the absence of an experienced operator and suitable facilities, operation had best be deferred.

In operations for the various classes of cases of extrauterine pregnancy, as well as other conditions in which abdominal section is required, the patient's chance of recovery is greater if the operation can be conducted in a well-ordered hospital. Consequently, the patient should be taken to a hospital if possible. Even a trip on the train, with the patient on a stretcher and in a strictly recumbent posture all the time, is less hazardous than operation in poor surroundings. The marked emphasis which teachers and writers generally have placed upon promptness of operation in extrauterine pregnancy has unfortunately led to considerable indiscriminate operating in these cases—operations on patients in which it would have been safer to wait a while, operations without adequate antiseptic preparation, operations by persons without sufficient surgical experience to handle the serious intra-abdominal conditions in a safe and effective way. Even in the restricted class of cases in which there is free intraperitoneal hemorrhage, the so-called "tragic" cases, it is probable that not many patients really die at once from the loss of blood. There are some that do, but they are comparatively few, as indicated by mortuary records and by the number of patients that come to operation later with a history of having passed through a severe attack of intraperitoneal hemorrhage. It is the repeated hemorrhages, with the resulting peritoneal irritation and inflammation coming on within a few days or a few weeks, that constitute the greatest menace and that cause the death, rather than the mere withdrawal of a certain amount of blood from the circulation at the primary rupture. This being the case, the patient has a better chance of surviving the primary loss of blood if simply kept quiet without operation, than if operated on at an inopportune time or without reliable antiseptic preparation, or by a person without adequate experience in abdominal surgery.

In most of these cases, the hemorrhage has ceased by the time the physician reaches the patient. Whether this is the case can be determined with a fair degree of certainty, as a rule, by watching the patient for a short time. If the hemorrhage has ceased, it will be seen that the pain is diminishing and the pulse getting better. If it is decided to defer operation until the patient has recovered from the shock and the acute anemia, the patient must be kept quiet in the horizontal posture absolutely and should make no voluntary movement; no sitting up, or moving of the extremities or straining; no enemata or purgatives. If she is to be moved to a hospital, it must be with practically no more disturbance than if she were lying flat in bed. For the first 48 hours avoid bowel movement if possible and give very little food. The severe thirst, caused by the blood loss, may be relieved by small doses of water, and by saline solution per rectum by the drop method (proctoclysis). Pain and restlessness are to be relieved by sedatives hypodermically or by mouth. Guard against vomiting and avoid pelvic examination, for either is very likely to start up fresh hemorrhage. After the first two or three days a little more freedom may be allowed as regards nourishment, enemata and movement of arms and legs. But the patient must maintain the horizontal posture strictly. The patient must be especially warned against straining in any way and against trying to sit up a little because she feels better. An attempt at sitting up in bed may undo all the good of the previous rest, as shown in the case previously mentioned. Where the hemorrhage has been very severe it will usually require ten days to two weeks for the patient to recuperate sufficiently to present a good margin of reserve force for the operative work. With a less abundant internal hemorrhage the patient may be in good condition for operation within a few days.

It must not be forgotten that in these cases there is always the possibility of the hemorrhage starting up again suddenly, in spite of the care to prevent it. Consequently, it is always better if the patient is in the hospital while waiting for her "deferred operation." Then, if renewed hemorrhage develops, operation can be carried out promptly before the patient again passes into the condition of extreme collapse. These desperate cases, where the vital forces are at a low ebb, require much judgment and discrimination as to when to operate in a particular case and as to just what to do at the operation—on the one hand, to stop the bleeding and thus prevent the patient from passing into an absolutely hopeless condition, and, on the other hand, to avoid snuffing out the little spark of life remaining by the added strain of intraperitoneal manipulations and anesthesia. The anesthesia and operative work must be reduced to a minimum, both in duration and extent. Some cases can be satisfactorily operated on under local anesthesia, and occasionally there is a case in which the patient's sensibilities are so obtunded that practically no anesthesia is necessary for the work required.

By the term "local anesthesia" is meant a true local anesthesia (as induced by cocaine or eucaine, or some similar preparation) and not general anesthesia by hypodermic injection. One must warn particularly against the use of scopolamin (hyoscin) in these cases where the depression is so marked. The induction of general anesthesia by hypodermic injection of this drug is not the simple and harmless procedure one might infer from the tenor of the flood of advertising literature which is being sent out by a certain interested commercial house. A number of deaths have been caused by the use of this drug, and it is especially dangerous in the serious conditions with marked depression. When necessary to give something to relieve pain or produce general anesthesia in the class of cases under consideration, it is better to use some reliable drug the effect of which is uniform and can be accurately gauged and depended upon—such as morphine hypodermically or ether by inhalation.

5. **Pelvic Hematoma** (Figs. 797, 798).—If there are any evidences of active or recurring hemorrhage, the preferable treatment is abdominal section with removal of the damaged tube and the blood-mass. If there is simply a quiescent blood collection in the connective tissue, keep the patient quiet and watch. If the blood-mass is gradually absorbed, keep the patient quiet till the mass has largely disappeared, and then she may be allowed up and be counted practically well. If the mass remains stationary and symptoms of pronounced irritation persist or arise later, the patient should be subjected to operation—abdominal or vaginal, as indicated by the location of the mass and the accompanying symptoms.

6. **Advanced Cases.**—These cases vary so much that it is impossible to give a rule applicable to all.

In some of them immediate operation is indicated, while in others it is advisable to wait for a time, either because the child has only recently died and the placenta and adhesions are still dangerously vascular, or, in rare cases, because there is good reason to hope for saving the child without unjustifiable risk to the mother.

OTHER PELVIC DISORDERS

HEMORRHAGE

When there is hemorrhage into the pelvis from any cause, if the blood passes into the peritoneal cavity, it is known as "intraperitoneal hemorrhage." If the amount of blood is small and becomes shut in the pelvic cavity by a roof of exudate and adhesions above, it is referred to as a "pelvic hematocele." If the blood, instead of passing into the peritoneal cavity, passes into the connective tissue, the resulting condition is called "pelvic hematoma."

The usual cause of blood in the pelvis is extrauterine pregnancy, the characteristics of which have just been presented.

Hemorrhage into the pelvis occasionally occurs, however, from other **causes.** A collection of blood in the pelvis, either in the pelvic peritoneal cavity or in the connective tissue, may be caused by any one of the following conditions:

1. Rupture of a varicose vein of the broad ligament.
2. Hemorrhage from a fallopian tube, due to inflammation or to a polypus, or some other tumor of the tube.
3. Hemorrhage from an ovary, due to acute congestion or inflammation, or to a papillary growth.
4. Rupture of one of the dilated vessels on a large tumor.
5. Hemorrhage from injury due to a blow or fall.
6. Hemorrhage from injury due to forcible reposition of an adherent uterus.

The **diagnosis** is made by the same symptoms that indicate hemorrhage in extrauterine pregnancy, but without the evidences of pregnancy.

As in the vast majority of cases of spontaneous pelvic hemorrhage the cause is extrauterine pregnancy, this affection must be excluded in any particular case before any other diagnosis is permissible. Sometimes this may be excluded by the circumstances of the case—for example, the patient may be a virgin, or may be past the menopause, or may have had no recent opportunity of becoming pregnant. In some cases the differential diagnosis cannot be made until the operation, when one of the causes above mentioned may be apparent, with absence of indications of tubal pregnancy. In a doubtful case the diagnosis should be reserved until the suspicious mass, removed at operation, has been submitted to microscopic examination. In a tubal pregnancy, ruptured early and not operated on for several weeks, all naked eye evidence of the pregnancy may disappear. But by microscopic examination of the affected tube, evidence of the pregnancy may be found.

The **treatment** of pelvic hemorrhage not due to tubal pregnancy depends on the circumstances of the case. If the hemorrhage is into the connective tissue (hematoma) and well circumscribed, palliative treatment only is indicated. This consists of perfect quiet in the recumbent position, elevation of the foot of the bed and an ice bag over the abdomen, and sedatives sufficient to give rest. In intraperitoneal hemorrhage of slight extent, where tubal pregnancy can be excluded, the same treatment is indicated. In either case the effused blood may be largely absorbed. If after a time it still remains and gives trouble or suppurates, the hematoma or hematocele, as the case may be, has to be opened from the vagina, emptied and packed with gauze, the same as a pelvic abscess.

If there is serious intraperitoneal hemorrhage, it requires abdominal section, if the patient is in fit condition, the additional steps in the intraabdominal treatment depending upon the conditions found within the abdomen.

FULMINATING PELVIC EDEMA

Fulminating pelvic edema is the term applied to an intense and widespread edema of the pelvic interior, that comes on suddenly without apparent adequate cause. It is accompanied by serious symptoms and usually extreme prostration. In fact, the sudden onset, the severity of the symptoms and the marked collapse suggest ruptured tubal pregnancy, and this mistaken diagnosis has been made in some of the cases. It is a rare condition and presents a puzzling problem in etiology and in diagnosis. Most of the cases have been associated with chronic inflammatory lesions in the pelvis, but why the sudden edema and serious symptoms should develop without apparent cause has not been satisfactorily explained. Clinically, however, the condition must be recognized and treated; hence its inclusion here.

The salient features in the **pathology, symptomatology** and **treatment** of this rare affection can best be presented by detailing some typical cases.

Fulminating Pelvic Edema.—The author was called in consultation to see a patient with pelvic disturbance. It was Sunday; the patient had attended church in the morning feeling fairly well, but while there became very sick and could scarcely get home. She had a chill, followed by severe headache and general aching, but no localizing symptoms. There was no apparent local trouble in any part of the body to account for the fever, which rose to 105.5°. By evening there was evidence that the pelvis was the seat of the disturbance and it was then the author was asked to see the patient, about 10 p. m.

Examination. The temperature had been reduced to 104°. The pulse was rapid, but of fair volume. The pelvis was filled with a tender mass which surrounded the uterus and fixed it firmly. There seemed to be acute pelvic inflammation with extensive exudate. But there was no apparent cause, either recent or remote. The patient had always been rather nervous and this had been somewhat worse of late, but there had been no symptoms indicating pelvic disease of any kind. The next day the temperature was 104.2°, pulse 120, respiration 28, and there was much peritoneal irritation. Operation was at once indicated to check the rapidly progressing inflammation if possible, and accordingly the patient was taken to the hospital.

Operation. When the abdomen was opened the pelvis was found filled with small encysted collections of fluid involving the tubes, ovaries, broad ligament and uterus. The cysts or pseudocysts were of various sizes, were filled with clear serum and seemed to extend deeply into the substance of the organs involved. From the appearance a hydatid disease was suspected. All the cysts that it was feasible to remove were removed, and the pelvis drained through the abdominal incision.

The temperature dropped within a few hours to 98°, and it did not again go high. During the first part of the period of convalescence it ranged from 99° to 100.2°, and later dropped to normal, where it remained. The wound and drainage tract healed rapidly and the patient had a smooth convalescence. Laboratory examination of the tissues removed showed no bacteria of any kind, no evidence of hydatid disease, and no specific pathologic process that would adequately account for the alarming symptoms and the marked tissue change.

Fulminating Pelvic Edema.—Reported by Briggs. A married woman, whose menstruation had been normal, came complaining of malaria and some pelvic pain. Pelvic examination showed nothing abnormal except a slight fullness about the left adnexa. Two days later the patient returned to the office, very sick. Her face was pale and pinched and anxious; pulse 120, small and weak; temperature, 100°. The pelvis was then completely filled with a fluctuating mass. The rapid development of the mass, with almost no fever, pointed to hemorrhage as the cause, and a diagnosis of tubal pregnancy was made. At the operation, the pelvis was found filled with small cysts of various sizes, formed by collections of serum within the connective tissue. There was no tubal pregnancy. The pelvis was drained and the patient recovered.

Fulminating Pelvic Edema.—Reported by Briggs. Patient's menstruation was delayed four days, then came on scanty and was accompanied by paroxysmal pains, which caused the patient to think she was having a miscarriage. After some days the pain became more severe and the patient had two fainting spells. Temperature was normal, pulse 90 and small and compressible. The abdomen was sensitive. Sedatives were given, which diminished the pain, but the shock increased. The radial pulse became imperceptible and the skin and mucous membranes were markedly anemic. The uterus was enlarged, retroverted, fixed and sensitive, adnexa not felt. Liquid could be demonstrated in the flanks. Diagnosis, tubal pregnancy with rupture.

Operation. The pelvis and lower abdomen were filled with great blebs due to the collection of serum in the connective tissue, causing the peritoneum to pouch into the pelvis from all directions. Both tubes were chronically inflamed and the right ovary was enlarged and cystic.

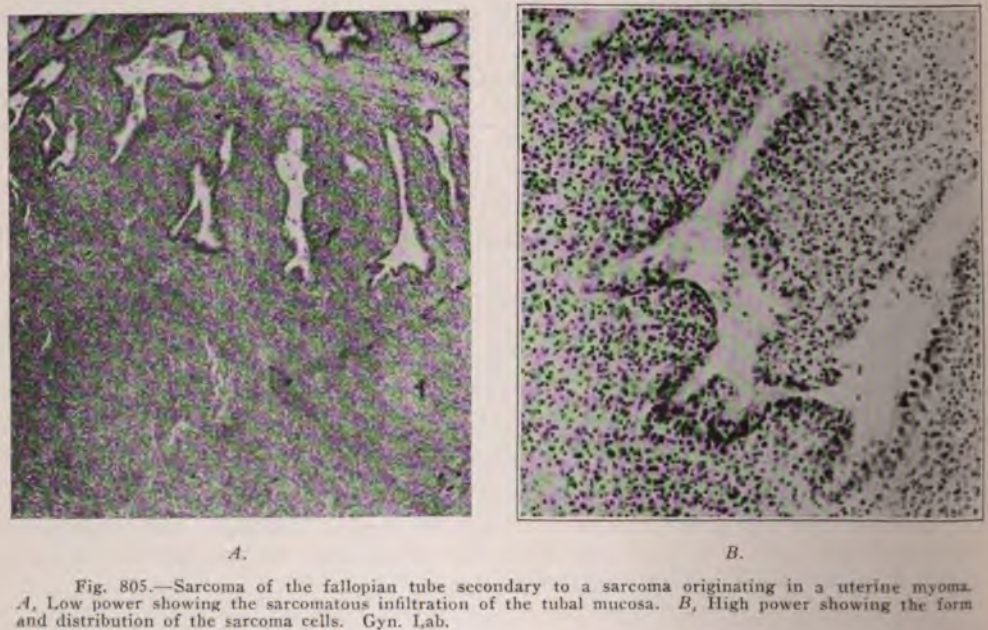
The patient's condition continued bad and she died some hours after the operation. The feature of the case was the enormous amount of serum pocketed in the connective tissue, without any evidence of recent inflammation.

Fulminating Pelvic Edema.—Reported by Legueu. Shortly after a normal menstruation, patient was suddenly attacked with violent pelvic pain accompanied by syncope, extreme pallor and cold extremities. The abdomen was distended, hard and painful to pressure. Vaginal examination disclosed a fluctuating mass in the cul-de-sac. Diagnosis retrouterine hematocele. On opening the abdomen a quantity of yellow serum escaped. There were large collections of serum in the tissues about the right adnexa, aggregating a pint. The patient recovered. Examination of the serum showed only leucocytes and peritoneal cells.

Fulminating Pelvic Edema.—Reported by Jocet. Patient, aged 28, married eight years, no children, had, on three separate occasions, an attack of severe abdominal pain accompanied by an accumulation of fluid in the right iliac fossa, which presented the characteristics of hematocele. Twice the mass terminated by resolution and the patient was perfectly well in the intervals. The third time, after the usual symptoms of the supposed hematocele had continued some weeks with improvement, the patient was suddenly seized with violent abdominal pain, accompanied by pallor, anxious facies, and incessant vomiting. The mass enlarged and there developed features that pointed to inflammation rather than hemorrhage as the cause of the trouble. Operation showed the pelvis filled with encysted collections of serum, and finally, deep in the pelvis, there was found an old ovarian abscess, which was evidently the exciting cause of the surrounding edema.

TUMORS OF FALLOPIAN TUBES

Primary tumors of the fallopian tubes are rare. Adenomyoma of the tube is found at times, as mentioned under the distribution of adenomyomata (Chapter VIII). Fig. 623 shows an excellent example of this condition. Fig. 624 demonstrates the origin from the tubal lining. Carcinoma and sarcoma may occur here, and they present the same structure and tendencies as elsewhere. Secondarily, sarcoma may develop in the tubal mucosa in instances of uterine sarcoma, as shown in Fig. 805.



A. *B.*

Fig. 805.—Sarcoma of the fallopian tube secondary to a sarcoma originating in a uterine myoma. *A*, Low power showing the sarcomatous infiltration of the tubal mucosa. *B*, High power showing the form and distribution of the sarcoma cells. Gyn. Lab.

If arising from the interstitial portion of the tube, they produce the symptoms of similar tumors of the uterus. If arising from the outer portion of the tube, they correspond in position to tumors of the ovary.

It is interesting to note that chorioepithelioma has been found in a tube following tubal pregnancy.

The diagnosis of tumors of the tube is usually made after the abdomen is opened. They present no definite distinguishing characteristics, and when felt in examination are usually taken for growths arising from those structures in which tumors more frequently occur; namely, the uterus, the ovary or the broad ligament.

The treatment for tumors of the tube is the same as for like growths in other pelvic organs.

TORSION OF ADNEXA

Torsion of the approximately normal tube and ovary occurs occasionally giving rise to attack of pain in that region. Smith (Am. Jour. Obst. and Gynec., November, 1921) has reviewed the subject, detailing and analyzing the reported cases.

VARICOSE VEINS OF BROAD LIGAMENT

Occasionally the veins of the broad ligament are found markedly dilated (Fig. 806), and in the dilated veins are sometimes found thrombi and even small stones (phleboliths).

The principal etiologic factors of these varicosities are subinvolution of the broad ligaments following pregnancy, relaxation of the tissues from poor general health and obstruction of the venous circulation of the broad ligament by tumors, or by heart disease, or by loaded bowel, or by uterine displacement.

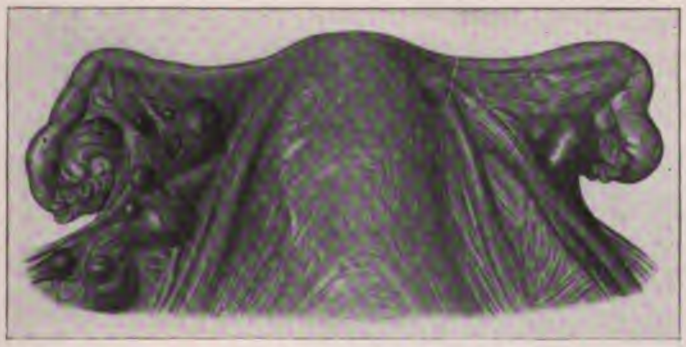


Fig. 806.—Thrombosed veins of the broad ligament. (Schaeffer—*Hand-Atlas of Gynecology.*)

The symptoms (weight and pressure when upright and relieved by the recumbent posture) are not distinctive—in fact, the condition is usually overshadowed by more evident lesions. In most cases so far reported this condition was thought of only after the abdomen was open and the enlarged veins were apparent.

In cases of persistent pelvic pain without palpable lesion, this condition should be thought of, and if the symptoms are severe in spite of palliative measures it may be advisable to make an exploratory abdominal section, with the idea of correcting this condition if found.

When phleboliths or thrombi (Fig. 806) are present, they may in exceptional cases form masses that can be felt on bimanual palpation.

The treatment is abdominal section and ligation of the enlarged veins at short intervals, and free incision and evacuation of the ligated portions.

ECHINOCOCCUS DISEASE OF PELVIS

Echinococcus disease is occasionally found in the pelvis. For a description of this affection see Echinococcus Disease of the Uterus. When it affects other pelvic structures, it is supposed in most cases to come from the rectum by way of the perirectal connective tissue.

PSEUDOTUBERCULOSIS OF PERITONEUM

This is a rare condition, in which the pelvic peritoneum is studded with small opaque, thickened spots, presenting the superficial appearance of peritoneal tuberculosis. Microscopic examination of the involved tissue, however, shows no tuberculosis, but simply chronic inflammatory infiltration.

CHAPTER XII

TUMORS OF THE OVARY AND PAROVARIUM

Before taking up the tumors of the ovary and parovarium, the author wishes to call attention to certain points in the anatomy and physiology of the structures involved.

POINTS IN ANATOMY AND PHYSIOLOGY

THE OVARY

The ovaries are situated one on either side of the uterus near the pelvic brim and close to the outer end of the fallopian tube (Figs. 3, 4). Each ovary projects from the posterior wall of the broad ligament of its respective side and the peritoneal fold thus formed is called the "mesovarium" (Fig. 807).

It is through this attachment to the broad ligament that the ovary receives its blood supply, this being the point where the vessels enter.

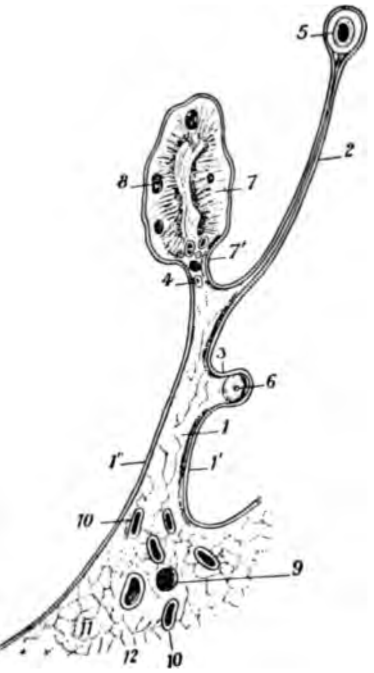


Fig. 807.—Vertical section through the broad ligament, showing the relation of the ovary to the same. *5*, Fallopian tube. *6*, Round ligament. *7*, Ovary. *7'*, Mesovarium, connecting the ovary with the broad ligament. (Jewett, from Testut—*Practice of Obstetrics.*)

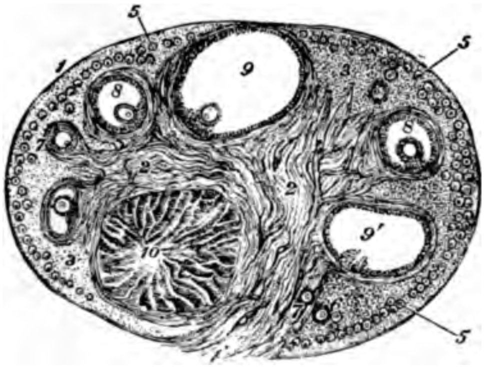


Fig. 808.—Section of the ovary of a cat. 1, Peritoneal surface of the ovary. *1*, Hilum. *2*, Medullary portion of ovary. *3*, Cortical portion. *5*, Small graafian follicles. *7, 8, 9*, Maturing graafian follicles. *10*, Corpus luteum. (Jewett, after Schoen—*Practice of Obstetrics.*)

The shape of the ovary is much like that of an almond. In size the ovaries vary much in different individuals, and even in the same individual the two ovaries may differ in size. Ordinarily the ovary is 1½ to 2 inches in length, about 1 inch in width, and about ½ inch in thickness. It weighs 75 to 150 grains.

Structure.—In structure the ovary is simply a bunch of ova, or microscopic eggs, supported and held together by the connective tissue which forms the frame-work. Each ovum is contained within a minute sac, called the ovisac or **graafian follicle** (Figs. 808, 809). The connective tissue extends between the follicles in all directions, and, in addition to supporting and protecting them, it carries the blood vessels that nourish them and also the lymph vessels and nerves. This connective tissue constitutes the **ovarian stroma** and it is peculiar in that it is exceedingly rich in cells (Fig. 809). These are spindle-shaped connective tissue cells, and they are packed so closely together than in an ordinary microscopic preparation the tissue seems to be made up exclusively of long, oval nuclei lying close together (Fig. 809). Near the periphery of the ovary the connective tissue fibers become more numerous and the nuclei fewer, so that there is here a rather dense capsule. This fibrous capsule of the ovary is known as the "tunica albuginea." It is simply a condensation of the ovarian stroma and serves to

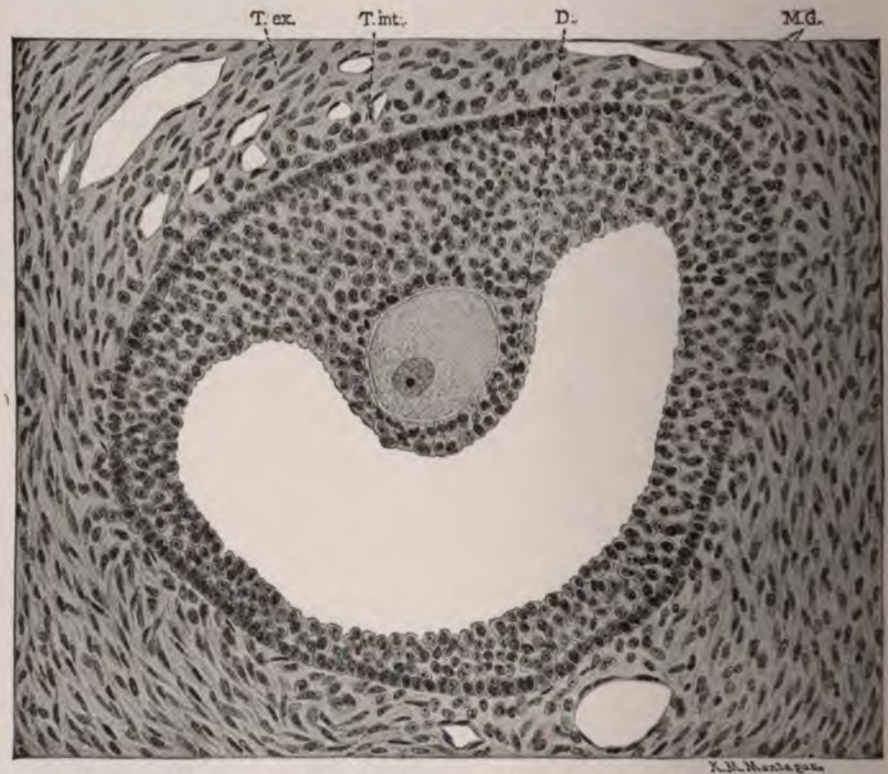


Fig. 809.—A graafian follicle with its contained ovum, highly magnified. M. G., membrana granulosa. The ovarian stroma is also well shown. (Williams—*Obstetrics.*)

protect the deeper structures of the ovary. Outside of this fibrous layer lies the epithelial covering.

That portion of the ovary at which the vessels find entrance and exit is called the **hilum** (Fig. 808). Immediately about the hilum, and extending some little distance into the ovary, is the area known as the medulla or **medullary portion.** This is occupied by the blood vessels, lymph vessels, the nerves and supporting connective tissue. It contains no follicles.

The remaining part of the ovary contains the graafian follicles, and is called the cortex or **cortical portion** (Fig. 808). The free surface of the cortical portion—that is, the peritoneal surface of the ovary—is covered with cylindrical epithelium, the remains of the germinal epithelium from which the ova and graafian follicles were formed by infoldings (Fig. 810).

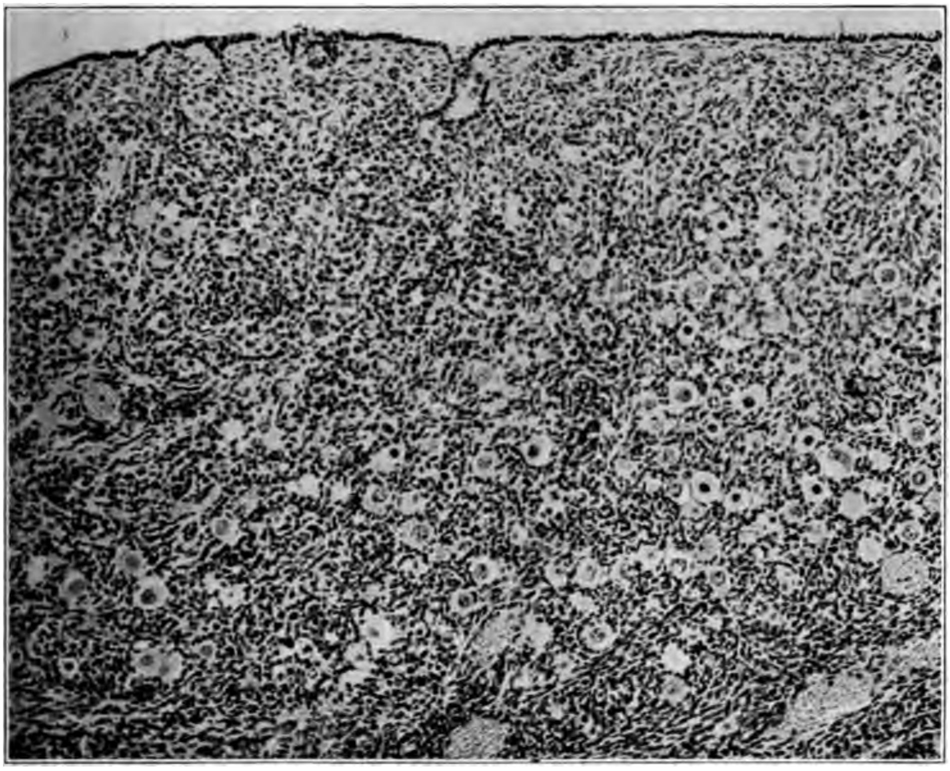


Fig. 810.—Ovary of a fetus of seven months, showing primordial follicles. Notice the large number of undifferentiated follicles, also the well formed ovi. The lower ovi are more or less surrounded by a definite single layer of cells, whereas those more superficial are not so clearly isolated. Gyn. Lab.

The graafian follicles are very numerous and of different sizes (Figs. 810 to 815). The small young follicles lie near the surface and number thousands. They are about 1/100 of an inch in diameter (Figs. 808, 811). The larger, older follicles lie deeper and are not so numerous. The largest of these measure 1/25 of an inch in diameter.

The graafian follicle is lined with an epithelial layer several cells thick, called the "membrana granulosa," and is filled with clear viscid fluid, the "liquor folliculi." The ovum lies within the follicle near one side and is completely surrounded by cells of the membrana granulosa (Figs. 814, 815, 816).

As the graafian follicle matures, it again approaches the surface and becomes still larger. It gradually protrudes at the free surface of the ovary and when ripe it bursts, liberating the ovum on the surface of the ovary, from where it finds its way into the fallopian tube. This ripening and bursting of the graafian follicle and liberation of the contained ovum is called "ovulation."

After the ripened ovum is discharged, the ruptured follicle fills with bloody serum, which cots. The rent in the follicular wall soon heals and the blood clot becomes partially decolorized. This follicle, filled with blood clot, is very prominent (Figs. 818, 820) and when encountered during the course of an operation has been mistaken for hematoma of the ovary, though it is simply a recently ruptured follicle and consequently a normal structure.

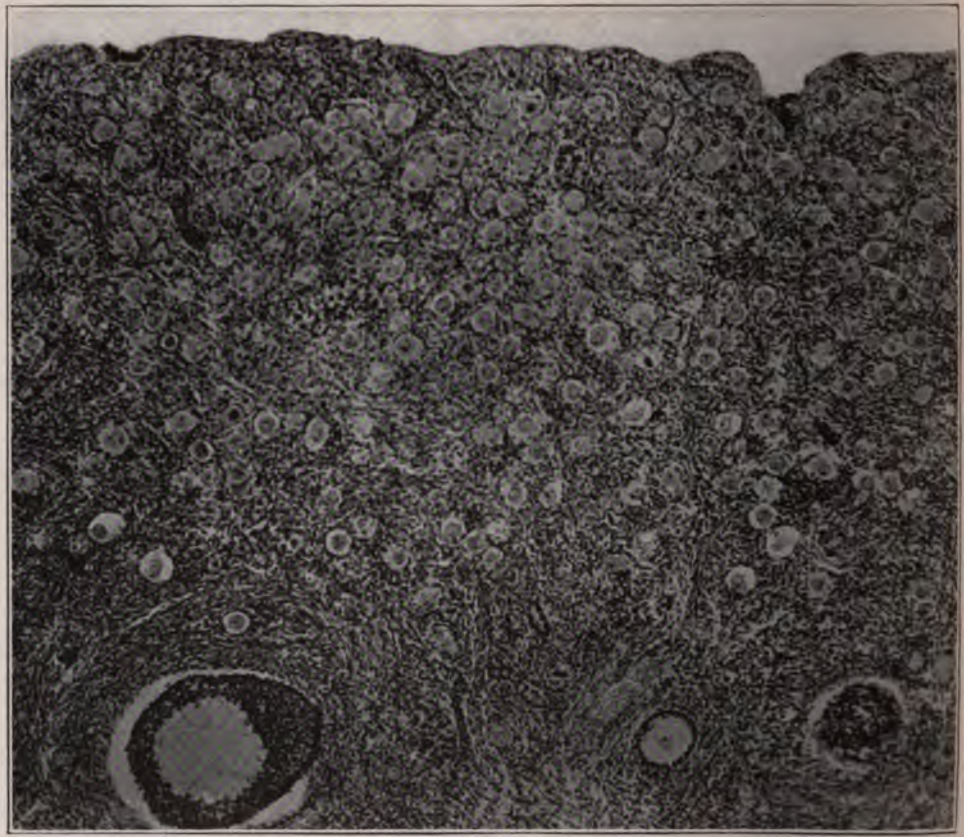


Fig. 811.—Ovary of a child of two years. Notice the large number of primordial follicles, imbedded in a stroma which is characteristically ovarian. Notice the tendency toward developing follicles in the deeper portion of the section. Gyn. Lab.

In a few days there appear certain peculiar cells containing pigment. These cells are large, resembling decidua cells. They are formed first about the periphery of the fibrinous mass, but they gradually increase in number and advance toward the center until finally they fill nearly the whole interior of the broken follicle. The pigment in the cells is yellow; consequently they are called "lutein" cells, and the mass formed by them is of course also yellow and hence is called the **corpus luteum** (yellow body) (Figs. 817 to 821).

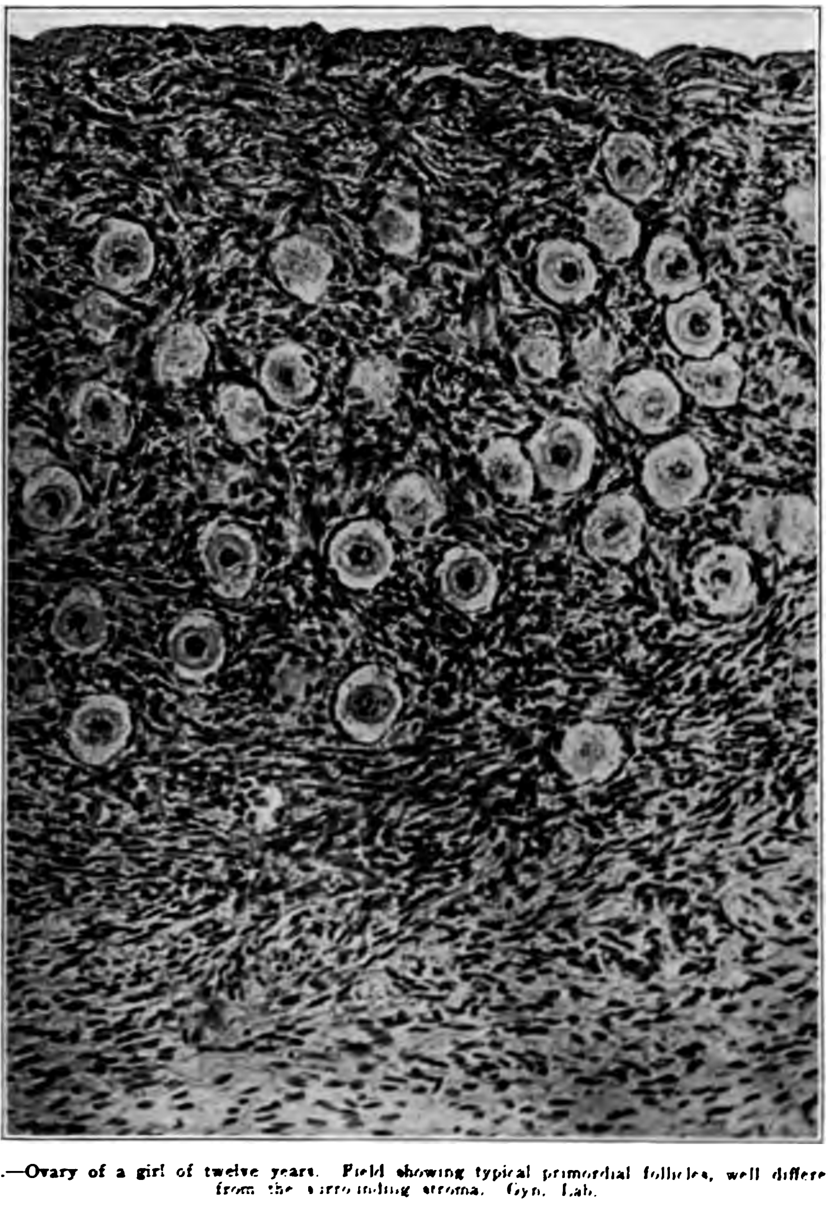


Fig. 812.—Ovary of a girl of twelve years. Field showing typical primordial follicles, well differentiated from the surrounding stroma. Gyn. Lab.

A section of a corpus luteum shows a wavy yellow outer portion formed by the lutein cells (Figs. 819 to 821). Under high power they can be seen lying closely along the thin-walled, newly formed blood vessels. It is this picture, characteristic of the structure of endocrine glands, which furnishes strong proof for the internal secretion function of the corpus luteum (see Chapter

XV). The source of these lutein cells is still in dispute. Most authorities hold that they are derived from the remnants of the membrana granulosa, while others state that they are developed from the connective tissue cells of the "theca interna" (the internal layer of the fibrous capsule of the graafian follicle).

The lutein cells gradually disappear and after a time the area of the ruptured follicle is occupied only by scar-tissue (Fig. 730). The area is then no longer yellow, but white, and consequently is called the **corpus albicans** white body (Figs. 822, 823). The corpus albicans, consisting of scar-tissue represents the final stage of the ruptured follicle. After many follicles have ruptured, the surface of the ovary often becomes very uneven on account of the number of these depressed scars (Fig. 823).

Ordinarily the corpus luteum passes through the changes described in a short time. If, however, pregnancy follows ovulation, the corpus luteum of that ovulation grows very large and remains for months before retrograde changes set in. The senile ovary is made up largely of old corpora lutea (Fig. 824). The follicles disappear and the stroma becomes more or less fibrous (Fig. 825).

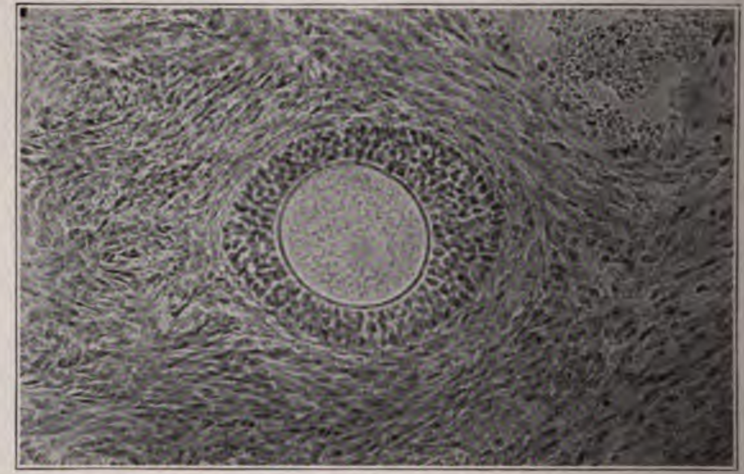


Fig. 813.—Adult ovary. Field showing a small follicle. Gyn. Lab.

Ligaments.—The ovary lies in the pelvis obliquely and its inner end is about one inch from the uterus. Extending from this end of the ovary to the uterus is a small fibromuscular cord, the "uteroovarian ligament," which joins the uterus just below the fallopian tube (Fig. 4). The suspensory ligament of the ovary, the "ligamentum suspensorium ovarii," is the thickened edge of the broad ligament connecting the ovary and tube with the side of the pelvis. The "infundibulo-ovarian ligament" extends from the ovary to the outer end of the fallopian tube.

Vessels and Nerves.—The ovary is supplied with blood by several branches of the ovarian artery, which corresponds to the spermatic artery in the male.

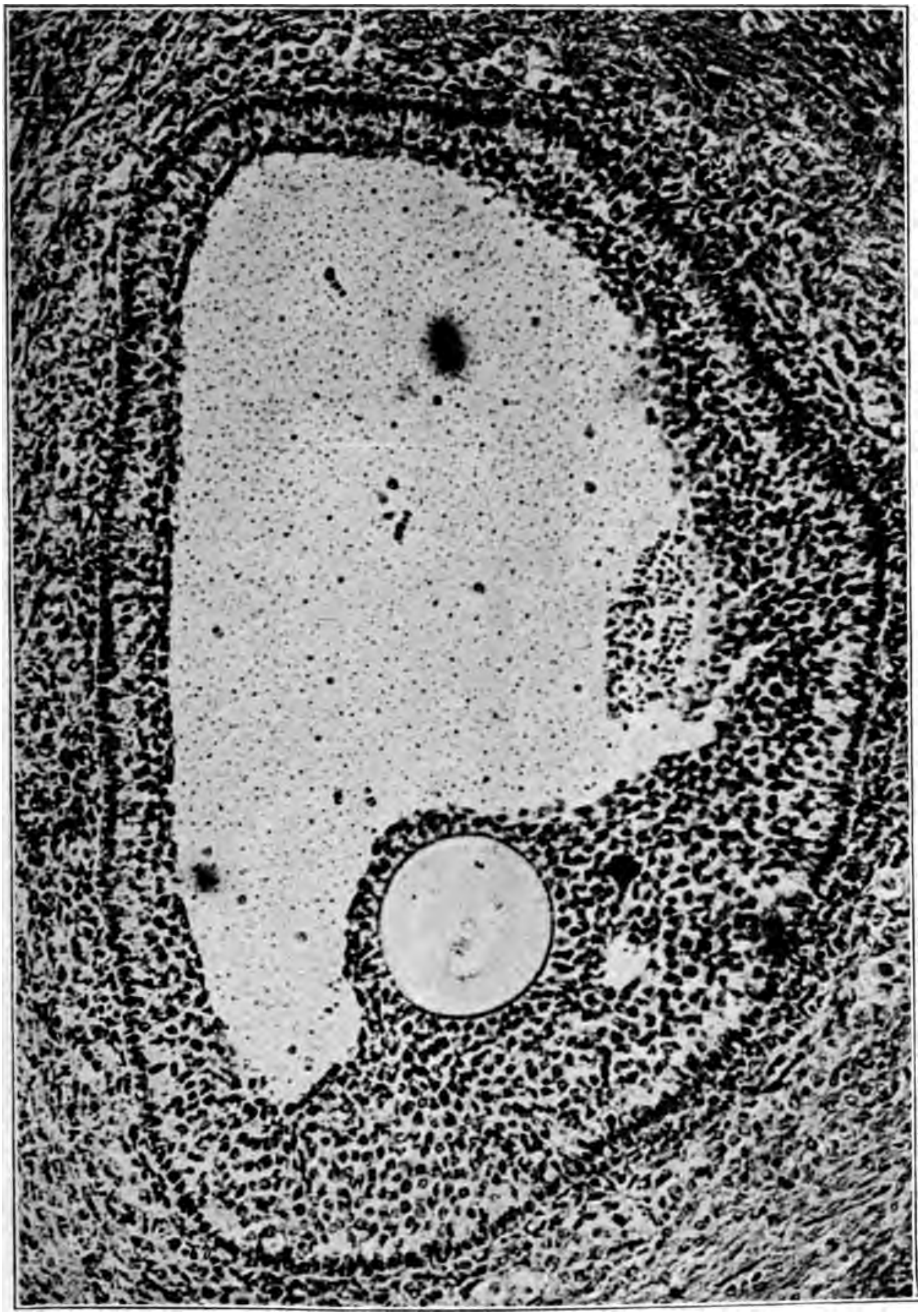


Fig. 814.—Adult ovary. A follicle further advanced in development. High power. Gyn. Lab.

The ovarian artery arises directly from the abdominal aorta and, passing downward to the side of the pelvis, enters the broad ligament and sends branches to the ovary and uterus and tube. The veins correspond to the artery and form a plexus near the hilum, which is known as the pampiniform plexus, sometimes called the ovarian plexus.

The lymphatic spaces surround the graafian follicles and ramify throughout the connective tissue of the ovary. They pass out at the hilum and anastomose with the uterine lymphatics in the broad ligament and empty into the lumbar glands.

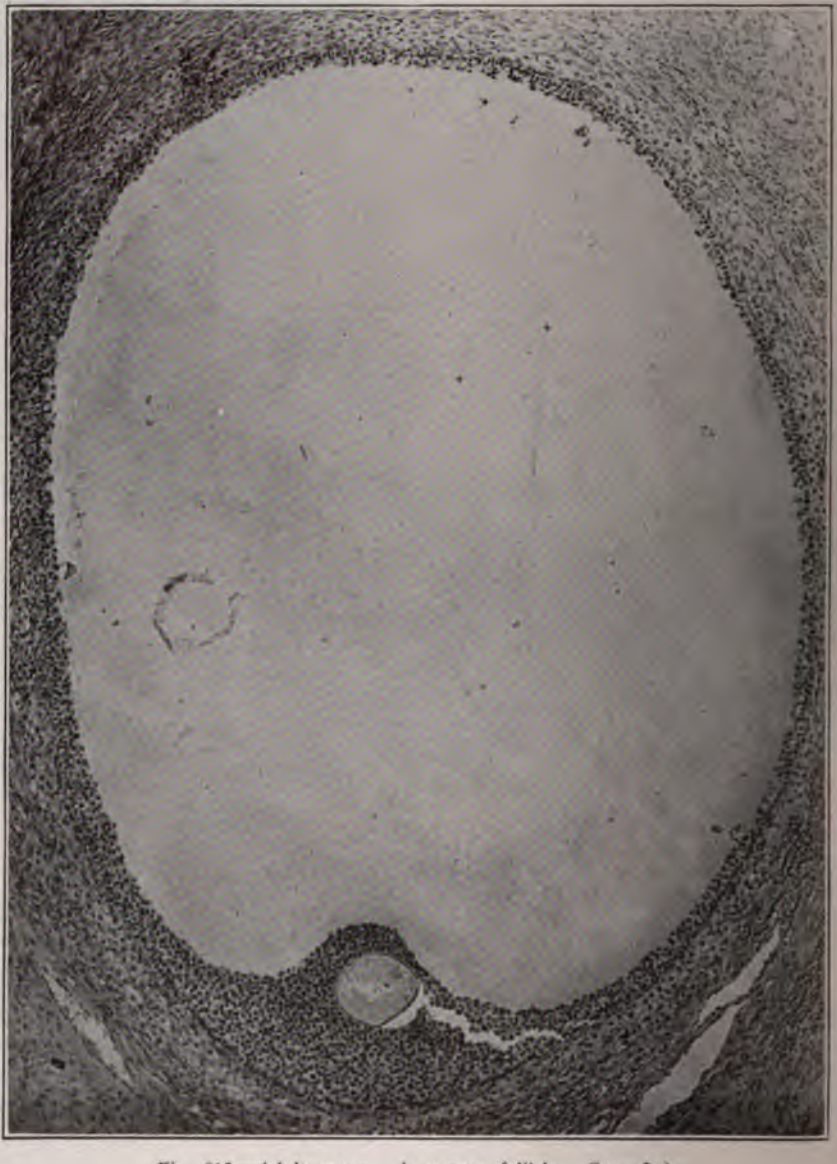


Fig. 815.—Adult ovary. A mature follicle. Gyn. Lab.

The nerves come from the renal and spermatic ganglia. The fibers pass along in the connective tissue framework to all the graafian follicles and terminate in the follicular epithelium.

Physiology of the Ovary.—The principal function of the ovary is the **formation of ova.** The ova are developed from primitive ova derived from the "germinal epithelium" of the embryo. In the formation of the ovary in the growing embryo, portions of the germinal epithelium are included within the organ, and from these included cells the ova and graafian follicles are developed (Fig. 810). A remnant of the primary germinal epithelium remains, as the layer of cylindrical epithelium covering the peritoneal surface of the ovary. In the preparation of ova, Nature displays a lavish hand. It is estimated that each ovary at the age of eighteen years contains 36,000 ova, but not more than 200 of these reach maturity.

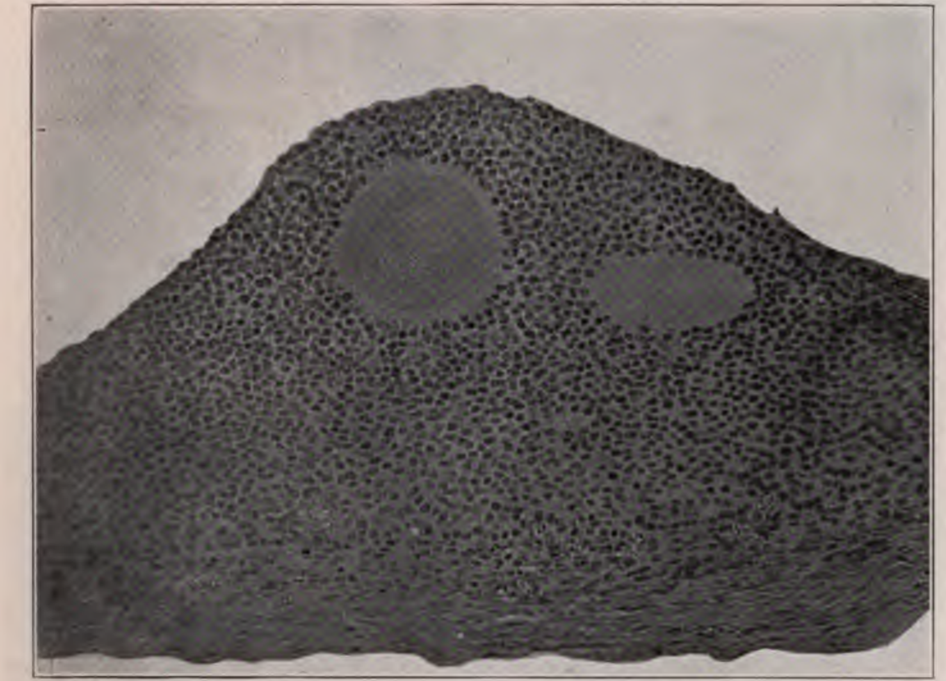


Fig. 816.—Adult ovary. High power of the cumulus of a mature follicle. Gyn. Lab.

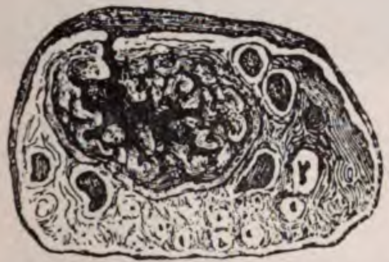


Fig. 817.—A corpus luteum, fifteen days from the beginning of menstruation. (Baldy—*American Textbook of Gynecology.*)

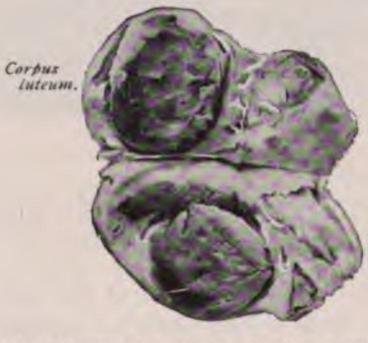
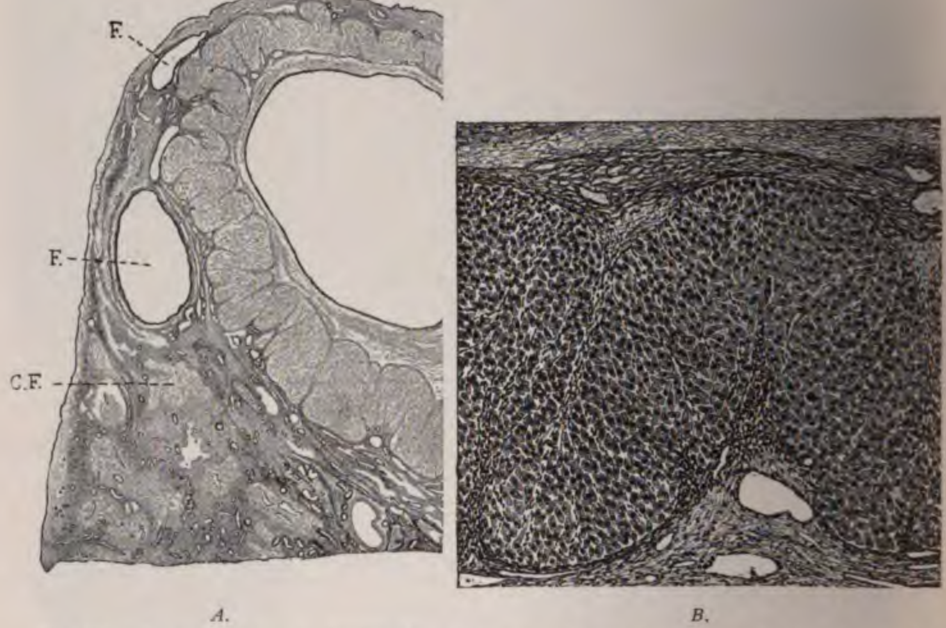


Fig. 818.—Ovary of a virgin, showing a corpus luteum. Notice what a large part of the ovary the corpus luteum occupies. (Piersol, after Hirst—*American Textbook of Obstetrics.*)

The **ovum,** which is the most important structure in the ovary, is a single cell composed of four parts, as follows:

a. A thick surrounding substance or membrane called the "zona radiata" or zona pellucida.
b. The cell substance or protoplasm, the inner portion of which is known as the "vitellus."
c. The nucleus or "germinal vesicle."
d. The nucleolus or "germinal spot."

The ovum is spherical, and when fully developed measures $\frac{1}{120}$ of an inch in diameter. Just before the ovum is discharged upon the surface of the ovary by the bursting of the follicle, as previously described, it goes through a process of ripening. This process is called "maturation" and consists in the karyokinetic division of the nucleus and the expulsion of a small portion of it. This occurs twice in succession. The cast off portions have been named "polar bodies." The polar bodies are apparently of no further use, as they soon disappear. It may be remarked here that certain tumors (teratomata) are supposed to originate from these polar bodies. The remains of the nucleus wander to near the center of the cell and the ovum assumes a resting state. It is then ready for impregnation. It is carried into the fallopian tube, and, if impregnation does not take place, passes into the uterus and out of that organ into the vagina and is lost.



A. *B.*

Fig. 819.—Corpus luteum. *A*, Section through a corpus luteum, low power, showing the distribution of the layer of luteum cells, as a wavy wall about the cavity. *B*, High power, of the luteum layer, showing details of the cells. (Williams—*Obstetrics*.)

In recent years it has come to be recognized that the ovary has another function, entirely distinct from ovulation. This is known as the **trophic function** or endocrine function of the ovary. By clinical observations and by experiments on animals the following facts have been established.

1. That the ovary controls menstruation. When the ovaries are removed, menstruation soon ceases. The ovary furnishes the "menstrual impulse," though the menstrual blood itself comes from the uterus.

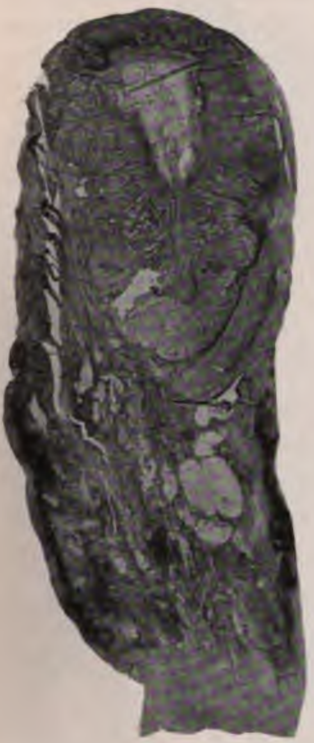


Fig. 820.

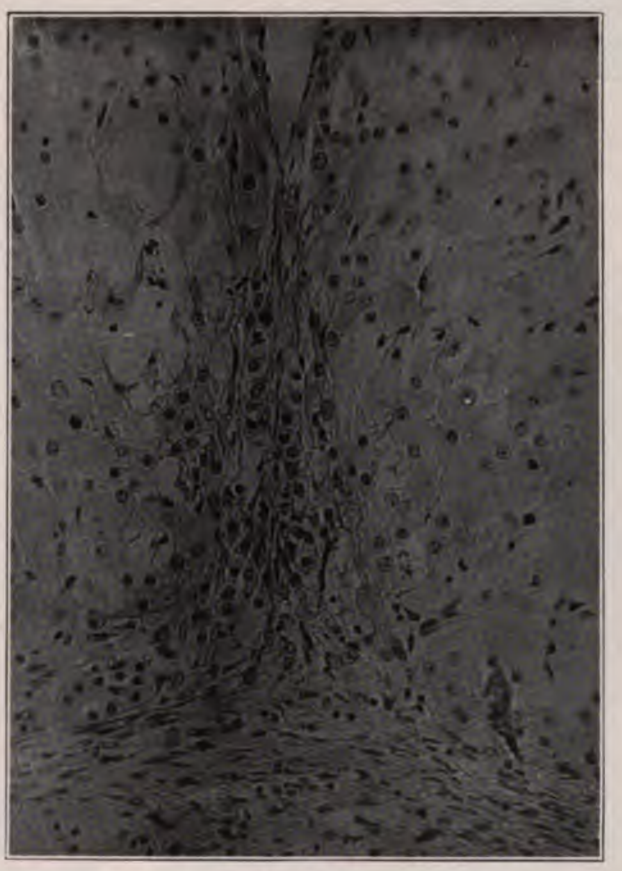


Fig. 821.

Fig. 820.—Normal adult ovary, showing a corpus luteum. The irregular wavy wall of luteum cells is well shown in the photomicrograph. Notice what a large part of the ovary is occupied by the corpus luteum. Gyn. Lab.

Fig. 821.—Lutein cells of a corpus luteum. High power photomicrograph of a margin of the wavy wall. Gyn. Lab.

2. That the ovary controls the development of the uterus and of the breasts. When the ovaries of newly-born guinea pigs were removed, the breasts and the uterus and even the external genitals failed to develop. When one ovary was left, the normal development took place the same as though both ovaries were present. Similar experiments on rabbits and on dogs gave identical results; i.e., the removal of both ovaries in the young prevented proper development of the uterus and the breasts.

3. That the ovary controls to a considerable extent the nutrition of the uterus, even in the adult. Numerous experiments in rabbits and dogs and cows have shown that after the removal of both ovaries the uterus slowly atrophies and develops the characteristics of senility. Clinical experience and pathologic investigation have shown that the same results slowly take place in women after the removal of both ovaries.

4. That the ovary exercises a decided influence on the nervous system. In very many cases after the complete removal of the ovaries there appear certain nervous disturbances. These are practically the same as are found accompanying the natural menopause—hot flashes, fleeting emotional disturbances and other evidences of an unstable or irritable nervous system. These occur so regularly after double oophorectomy that we expect them, and give to the symptom group the name "artificial menopause" or induced menopause. These symptoms usually subside after one or two or three years, as in the natural menopause. Occasionally, however, they persist and increase and become serious. If one ovary be left, or even part of an ovary that continues to functionate, these symptoms do not appear, showing that the ovary exercises the controlling influence. If still stronger proof of this fact be desired, it is found in this: In patients suffering with these troublesome symptoms following removal of both ovaries, healthy ovaries have been transplanted, with the result that the symptoms under consideration entirely disappeared, at least temporarily.

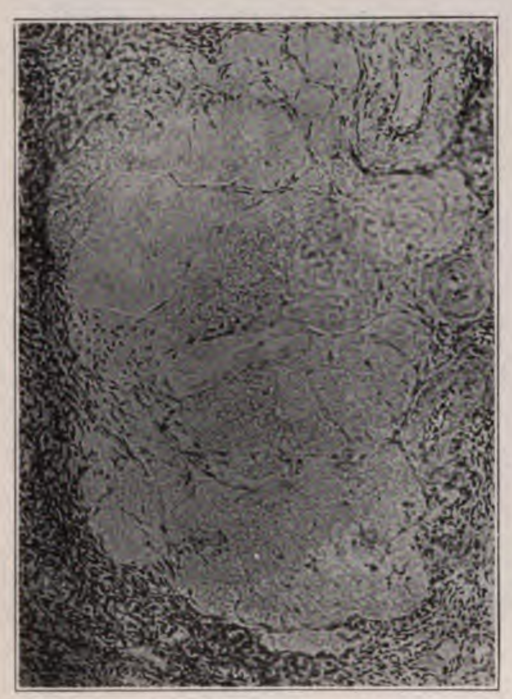


Fig. 822.—A corpus albicans, consisting of homogeneous hyaline material imbedded in the ovarian stroma. The corpus albicans is the enduring sign of a matured follicle. In old ovaries they are very numerous. Gyn. Lab.

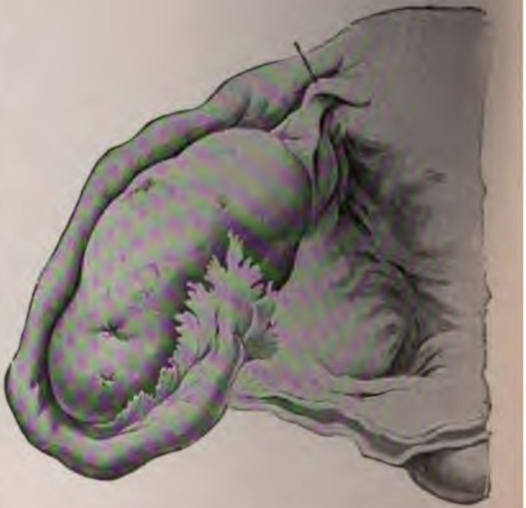


Fig. 823.—The ovary of a woman twenty-three years of age. Notice the depressed scars, resulting from ruptured follicles, and resulting contraction of corpora albicantia and scar-tissue. (Piersol after Sutton—*American Textbook of Gynecology.*)

Now comes the question, **how** does the ovary exercise this marked trophic influence, evidenced (1) by controlling menstruation, (2) by controlling the development of the uterus and breasts, (3) by controlling the nutrition of the uterus and (4) by controlling certain nervous disturbances? It was supposed for a long time that the influence was reflex, by way of the nerves in the ovary. But it is now pretty well established that it is not by the nerves, but by some substance which is manufactured in the ovary and thrown into the circulating blood. This action is designated by the term "internal secretion." It is analogous to the function of the thyroid gland, which, though it possesses no duct, produces a principle which finds its way into the circulation and exercises a marked influence over the general nutrition, as evidenced by the fact that when the thyroid gland is destroyed by disease or operation, there results that very serious condition known as myxedema. (See Chapter XV).

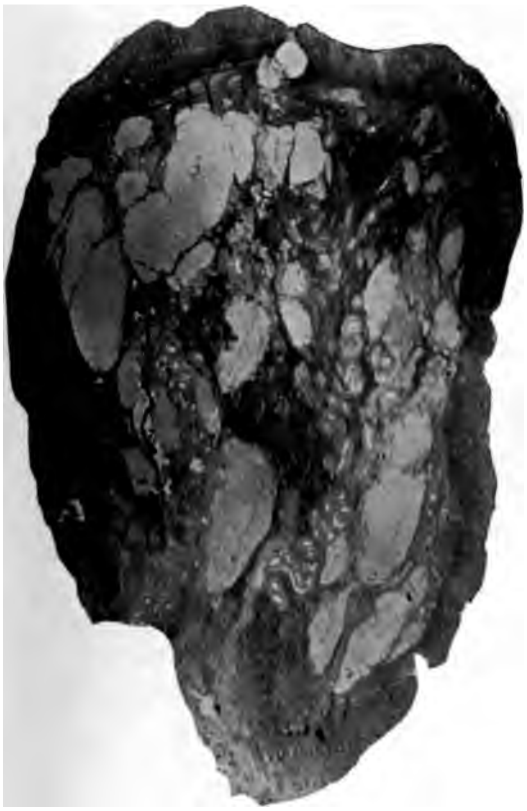


Fig. 824.—Senile ovary. Section of the entire ovary. Notice the masses of hyaline material, due to merged corpora albicantia, and also the thickened vessel walls. Gyn. Lab.

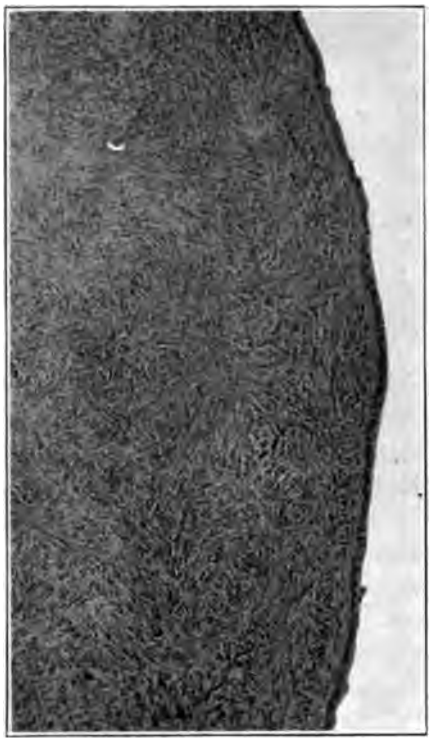


Fig. 825.—Senile ovary. High power photomicrograph from the margin. Notice the entire absence of follicles and the change in the stroma, so that it resembles fibrous tissue. Gyn. Lab.

That the powerful trophic influence of the ovary is due to an internal secretion into the circulation, and not to reflexes through the ovarian nerves, is indicated by the fact that if the ovaries be removed; i.e., entirely severed from their nervous connections, and transplanted to another part of the body—they still exercise the same influence. This has been demonstrated over and over again by various authorities. In guinea pigs the ovaries were removed from the pelvis and transplanted under the skin, with the result that the uterus and breasts developed normally. As the ovaries had been entirely severed from the pelvic nerves, the only possible way for them to influence the uterus and breasts was through the circulation. In rabbits and dogs transplantation of the ovaries to various parts of the body has given similar results.

In the human patient transplantation of an ovary from one patient to another has been successfully carried out a few times and with decidedly beneficial results. There is not space to go further into the interesting experiments along this line. Enough has been said to show that the ovary has two important functions, (1) the formation of the ova suitable for impregnation and (2) the nutritional effect (probably due to the internal secretion into the circulation of some substance), by which is exercised a controlling influence on menstruation, on the development of the uterus and breasts, and on certain nervous disturbances.

Based on the latter function of the ovary are certain **therapeutic measures** which have come into prominence in the last few years. They are as follows:

1. **Leaving Part of an Ovary.**—In the operative treatment of ovarian diseases, an ovary or part of an ovary is always preserved in place if the pathologic condition will permit.

2. **Administration of Ovarian Extract.**—If both ovaries must be sacrificed, the patient is afterwards given ovarian extract for the purpose of lessening the disturbances of the artificial menopause (see Chapter XV).

3. **Transplantation of an Ovary.**—In a patient presenting serious symptoms as the result of the removal of both ovaries by operation or their destruction by disease, a healthy ovary from another person is transplanted to the pelvis of the chronic invalid to supply again the ovarian trophic substance.

This has been carried out successfully in several instances. In one patient the transplantation operation was made two years after both ovaries had been removed. The patient was restored to health and there was also partial restoration of the menses. Still better results have followed the immediate transplantation of a healthy ovary during the primary operation in which both ovaries were so diseased that they had to be removed. In at least one case the menstruation continued regularly as though the ovaries had not been disturbed. This work is still in the experimental stage, but enough has already been accomplished to show that a healthy ovary, successfully transplanted, can continue its functions, at least for a limited time, and, consequently, that many women can be rescued from the condition of chronic invalidism caused by destruction of the ovaries or by imperfect development.

Investigations concerning the **trophic influence** of the ovary indicate that this influence comes **from the corpus luteum.** In fact it appears that the corpus luteum is a temporary secreting gland, the lutein cells being the active secreting cells. In support of the theory that it is the secretion of the lutein cells that controls menstruation and exercises the general trophic influence due to the ovary, the following facts have been cited:

a. In the transplantation experiments previously mentioned, if the transplanted ovary did not survive in such condition that ovulation took place, i.e., an ovum was discharged and a corpus luteum formed—no trophic influence was apparent. It was just as though no ovarian tissue were present.

b. Destruction of the corpus luteum in rabbits in the early part of pregnancy prevented complete development of the pregnant uterus and contained ovum. The effect was the same, whether the entire ovary was removed or simply the corpus luteum destroyed.

c. Destruction of the corpus luteum in the non-pregnant caused the next menstruation to be missed, indicating that the secretion of the lutein cells of the corpus luteum of each period prepared the uterus for the menstruation of the next period.

This destruction of the fresh corpus luteum was carried out in a series of nine women, who were being operated on for malposition or similar troubles that did not interfere with the observations. In eight of the nine cases the next menstruation was missed, the succeeding menstruations, however, occurring regularly.

d. In that class of cases in which the administration of desiccated ovarian tissue produces beneficial results the administration of lutein tissue alone sometimes gives similar results, indicating that the active principle of ovarian tissue is contained in the lutein cells.

THE PAROVARIUM

The parovarium is the remains of a fetal organ, the wolffian body, which helps to form the generative organs. It consists of a triangular group of tubules situated in that part of the broad ligament lying between the ovary and the fallopian tube. The apex of the triangle lies near the hilum of the ovary. Beginning near the hilum of the ovary, the tubules extend upward, almost parallel, or in a kind of fan-shaped formation, and enter a transverse tube. This transverse tube is called the "head tube" and it terminates in a small culdesac near the fimbriated extremity of the fallopian tube (Figs. 826, 827). Very often this little culdesac becomes distended with fluid and forms a miniature cyst on the surface of the broad ligament. But the little cyst thus formed is apparently distinct from another miniature cyst usually found in the same vicinity and called the "hydatid of Mor-

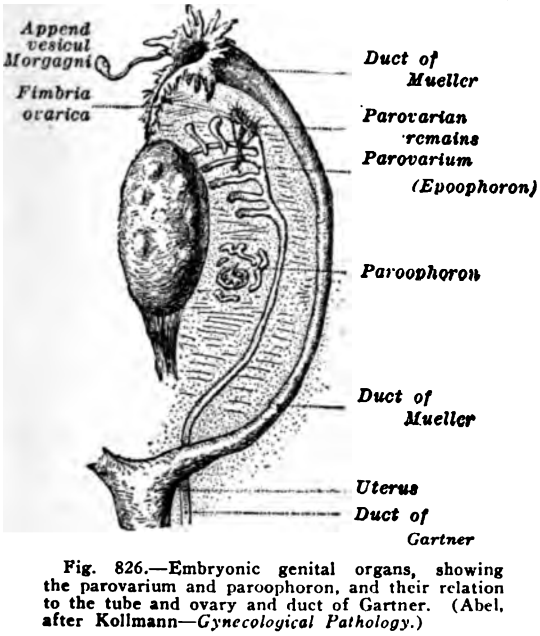


Fig. 826.—Embryonic genital organs, showing the parovarium and paroophoron, and their relation to the tube and ovary and duct of Gartner. (Abel, after Kollmann—*Gynecological Pathology*.)

gagni." The hydatid of Morgagni is the dilated end of another fetal structure—the duct of Müller, which forms the fallopian tube.

Another smaller group of remnants of the wolffian body which lies nearer the uterus is called the "paroophoron" (Figs. 826, 827).

The tubules of the parovarium and paroophoron are embedded in the delicate connective tissue between the layers of the broad ligament and have no connection with any of the surrounding organs.

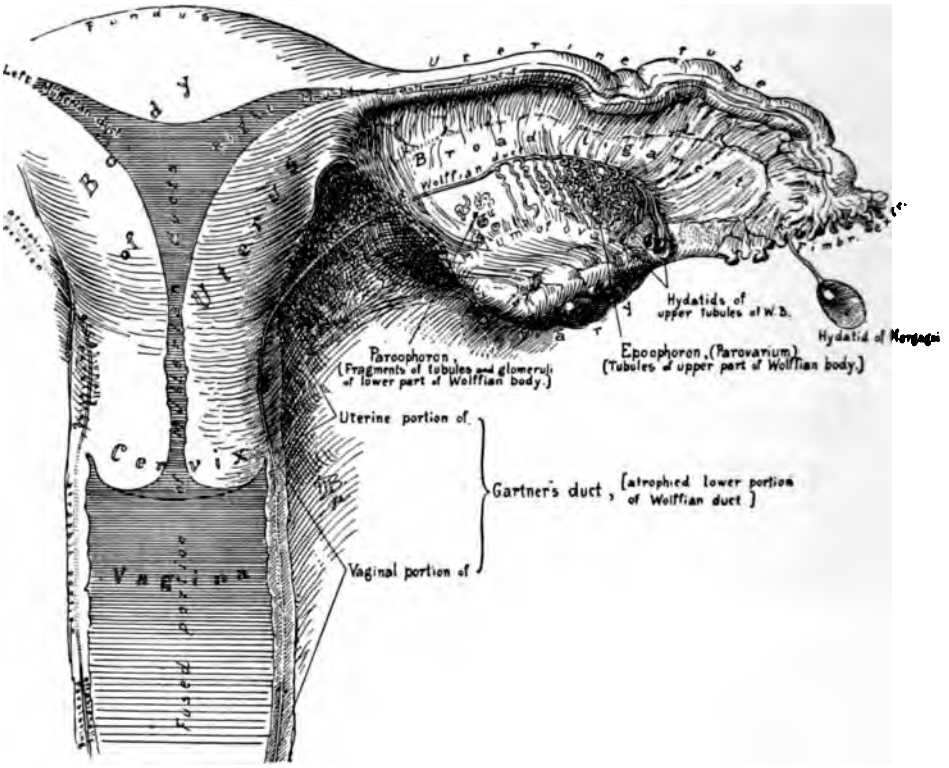

Fundus
Uterine tube
Left
Body of Uterus
Broad ligament
Wolffian duct
Fimbr.
Hydatids of upper tubules of W.B.
Hydatid of Morgagni
Paroophoron, (Fragments of tubules and glomeruli of lower part of Wolffian body.)
Epoophoron, (Parovarium) (Tubules of upper part of Wolffian body.)
Uterine portion of
Gartner's duct, [atrophied lower portion of Wolffian duct]
Vaginal portion of
Cervix
Vagina

Fig. 827.—Adult genital organs showing parovarium, Gartner's duct and various other structures. (Kelly, after Cullen—*Operative Gynecology*.)

The structure has no function, and it is of interest chiefly because it gives rise to certain tumors of the broad ligament.

CLASSIFICATION

of Tumors of the Ovary

It will be noticed that in the following table are included, under simple cysts some conditions that are not really tumors (new growths), but only inflammatory and nutritial changes. Clinically, however, they resemble so closely certain new growths that it seems best to consider them here. Keeping in mind this explanation, and also the fact that this is a clinical and not a pathologic classification, there should be no confusion.

Ovarian Tumors

- **Cystic Tumors** (95 %).
    - Simple Cysts.
        - Follicular Cysts.
        - Cysts of Corpus Luteum.
        - Tubo-ovarian Cysts.
    - Proliferating Cysts (Cystadenomata).
        - Pseudomucinous Cysts.
        - Serous Cysts.
    - Dermoid Cysts.
        - Endometrial Cysts (Adenomyomata).
- **Solid Tumors** (5 %).
    - Fibromata.
    - Myomata.
    - Papillomata (of surface).
    - Carcinomata.
    - Sarcomata.

CYSTIC TUMORS OF THE OVARY

These comprise simple cysts, proliferating cysts and dermoid cysts.

DEFINITION AND PATHOLOGY

Simple Cysts

Under this term are included follicular cyst, corpus luteum cysts, and tubo-ovarian cysts.

Follicular Cysts (Figs. 828, 829) are simply unruptured graafian follicles

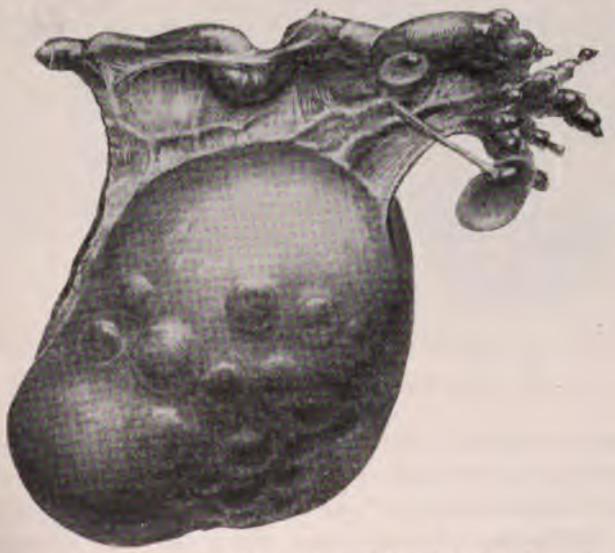


Fig. 828.—Follicular cysts of the ovary. (Kelly—*Operative Gynecology.*)

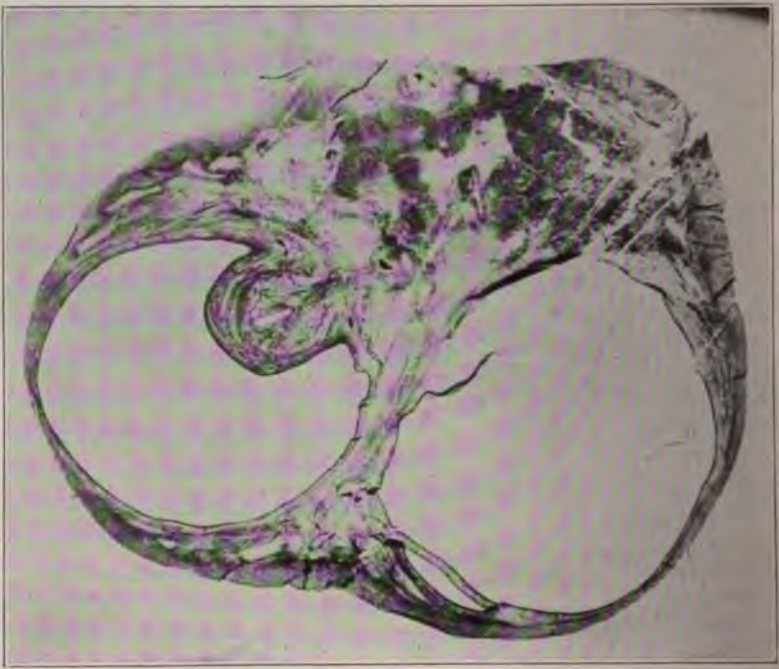


Fig. 829.—Cross section through an ovary showing two rather large follicular cysts. Gyn. Lab.

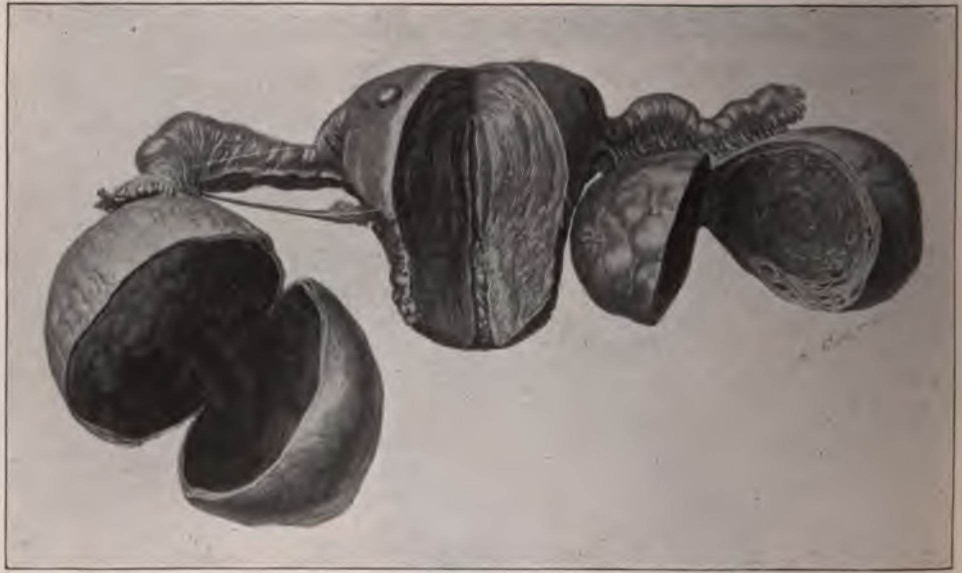


Fig. 830.—Corpus luteum cysts. (Kelly—*Operative Gynecology*.)

which have become dilated. The increase in the fluid of the follicle and the consequent formation of a small cyst is due to the failure of the follicle to rupture. This failure to rupture may be caused by the deep situation of the follicle or by thickening of the tunica albuginea (the fibrous coat of the ovary), or by peritoneal exudate on the surface of the ovary.

These follicular cysts are small and rarely produce serious symptoms. While a single cyst often involves only a part of the ovarian substance (Fig. 832), in other instances it may be found to affect the entire organ (Fig. 833). They are frequently found in chronic oophoritis, and an ovary may contain fifteen or twenty of them and still not be more than twice its normal size (Fig. 828). Such a condition is designated by the term "hydrops folliculi" and also by the term "cystic ovary." Such a condition is not an indication for operation, unless there are serious complications or unusually severe symptoms. Occasionally a follicular cyst will enlarge to the size of the fist, but that is rare.

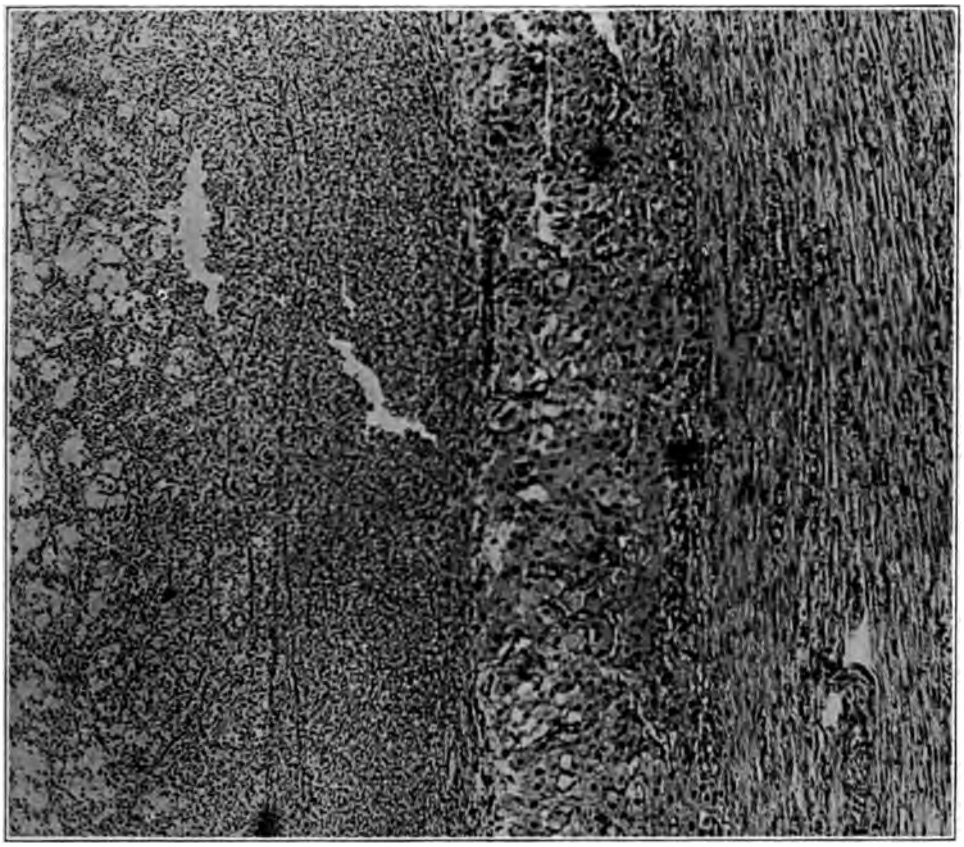


Fig. 831.—Section through the wall of a corpus luteum cyst. Notice the layer of large lutein cells. Gyn. Lab.

It was formerly supposed that the large proliferating cysts of the ovary were derived from these small follicular cysts, but that theory has been abandoned.

Corpus Luteum Cysts (Figs. 830 to 833) are, as their name indicates, derived from corpora lutea, which, instead of undergoing the regular process of absorption and cicatrization, undergo a cystic change. Microscopic examination of the wall of such a cyst will show the lutein cells, characteristic of the corpus luteum (Fig. 831). Corpus luteum cysts are usually not larger than an egg, though a few larger ones have been reported. They are more commonly seen in hydatidiform moles.

Tuboovarian Cysts are those cysts, usually small, which are formed by the tube and the ovary combined (Fig. 834). A simple cyst of the ovary may rupture into an adherent tube, or a dilated tube containing fluid (hydrosalpinx) may become adherent to an ovary and rupture into it. In either case the wall of the resulting cavity is formed by both the tube and ovary; hence the name "tubo-ovarian." These cysts are usually small.

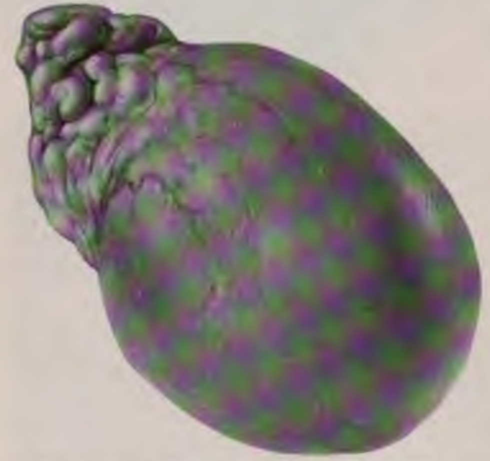


Fig. 832.—Single cyst leaving the larger portion of the ovary (left upper part in illustration) intact. Gyn. Lab.

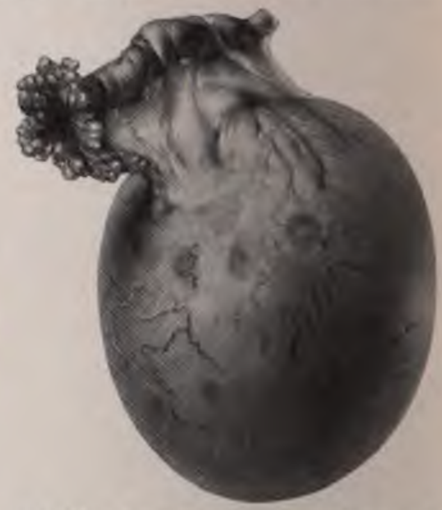


Fig. 833.—In contrast to specimen shown in Fig. 832, this cyst formation involves the entire ovary, which had to be removed together with the tube. Gyn. Lab.

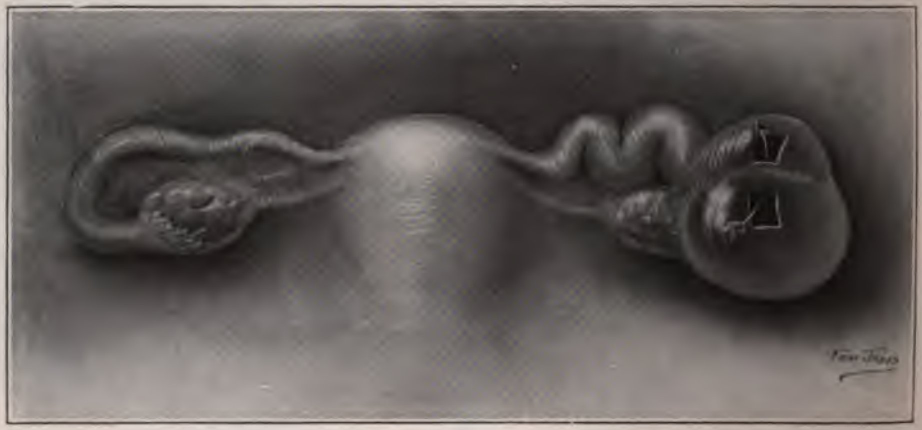


Fig. 834.—A tuboovarian cyst. The arrow, passing in one window and out of the other, indicates the communication between the ovarian and the tubal portion of the cystic mass.

None of the conditions described under simple cysts require operation, unless the symptoms are very troublesome and persistent. If the condition is discovered in the course of an abdominal section for some other trouble, the pathologic structure should ordinarily be resected, with the sacrifice of as little normal tissue as possible.

Proliferating Cysts

Proliferating cysts are the ovarian tumors which attain such a large size (Figs. 835, 836). This is the form of growth ordinarily referred to when an "ovarian cyst" or "ovarian tumor" is spoken of.

The term "proliferating" is given to these growths because they have the faculty of generating new cysts within the original cyst or on the outside of it. They increase in size persistently and there is no means of stopping their growth, except removal.

The proliferating cysts, or cystadenomata, are of two kinds—the pseudomucinous and the serous.

Pseudomucinous Cystadenomata.—This form of tumor is known also as "paramucinous cystadenoma" and as "cystadenoma evertens." In these cysts the contents consist of a jelly-like material which is secreted by the epithelial cells lining the cyst. This gelatinous material is the distinguishng characteristic of the pseudomucinous (Figs. 835, 836). On chemical examination it shows the reaction for paramucin or pseudomucin (not precipitated by acetic acid, but precipitated by alcohol as delicate threads, which are insoluble in water; mucin is precipitated by acetic acid, and albumen is precipitated by heat). The color of this gelatinous material depends on the amount of blood-coloring which has diffused through it from hemorrhage into the cyst, as explained later.

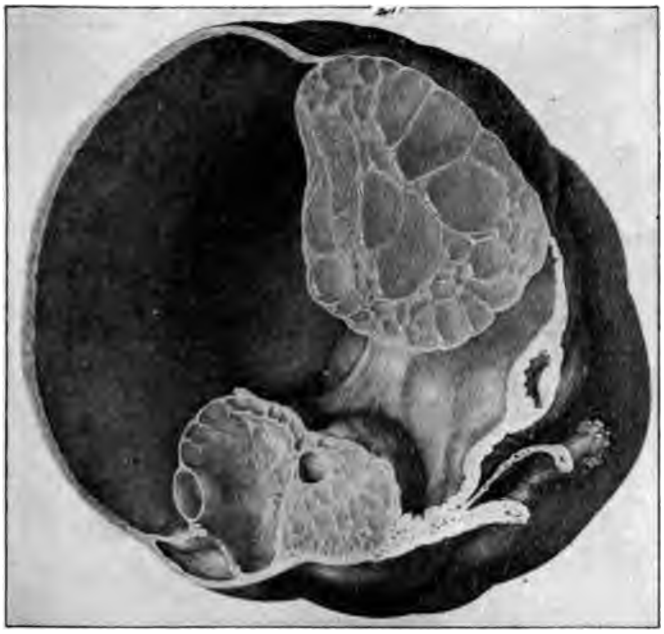


Fig. 835.—A pseudomucinous cystadenoma of the ovary. Notice the development of secondary cysts in the wall of the large cyst. (Kelly—*Operative Gynecology.*)

As the contents are formed by the secretion of the cells lining the cyst (Figs. 837, 838), there is a constant increase in the amount, and this causes constant internal pressure, which keeps the wall of the cyst tense. In this way the epithelial layer is kept spread out (Fig. 839-A) and does not so much tend to pile up along the wall as papillary projections. Rather the pressure tends to depress portions of the wall, and as the epithelial cells multiply they are pushed further out in the wall in the form of gland-like depressions, hence the name "evertens." The depressions may become occluded at the neck and are thus cut off from the main cavity forming secondary cysts. These secondary cysts are found in great numbers about the primary cyst and occasionally one or more of the secondary cysts may become as large as the primary one.

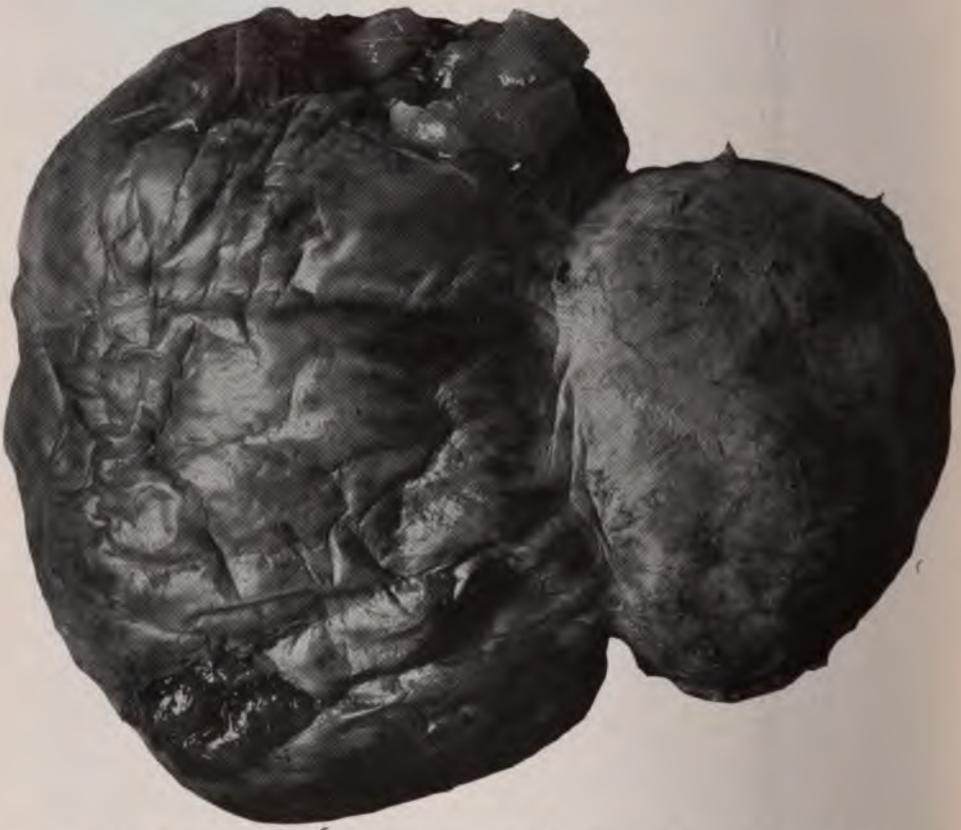


Fig. 836.—A large pseudomucinous cystadenoma of the ovary. In this case the contents were semi-solid like jelly, and would not flow through the largest tube. The cyst wall was so friable that it would not stand the manipulations necessary to scooping out the cyst contents. The gelatinous material within the cyst may be seen protruding through a rent in the wall at the lower part and also at the upper part. Gyn. Lab.

The rule that pseudomucinous cysts are evertent is not absolute. In nearly all such cysts there are a few insignificant epithelial ingrowths, and in rare cases these growths may predominate, giving a distinct character to the growth (pseudomucinous cystadenoma invertens). Such atypical pseudomucinous cysts are nearly always small, indicating that there was not much internal pressure.

The cells lining the pseudomucinous cyst present, on microscopic examination, the following characteristics:

They contain pseudomucin. This is contained in the inner end of the cell (the end next to the cyst cavity)—hence this end of each cell remains clear, because the pseudomucin does not take the ordinary stain used in the preparation of microscopic specimens (Figs. 838, 839).

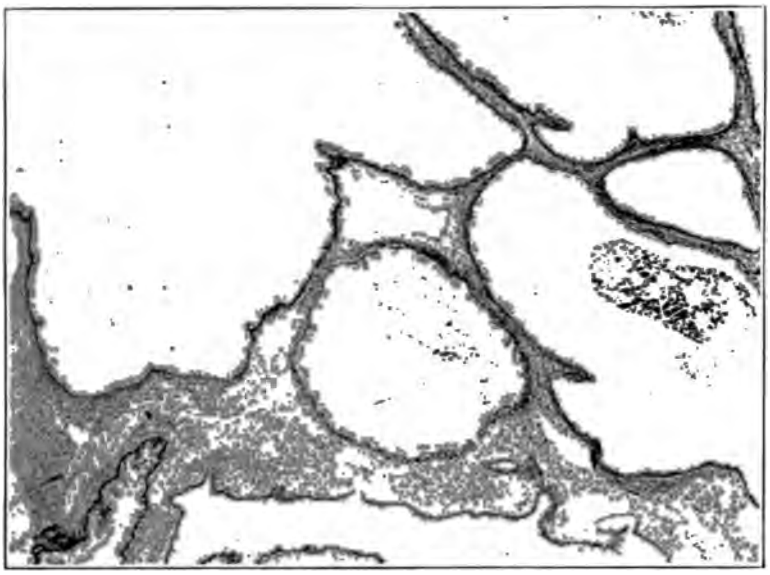


Fig. 837.—Pseudomucinous cyst of ovary, showing the multilocular formation. Each of these individual cysts is lined with the high columnar epithelium. Gyn. Lab.

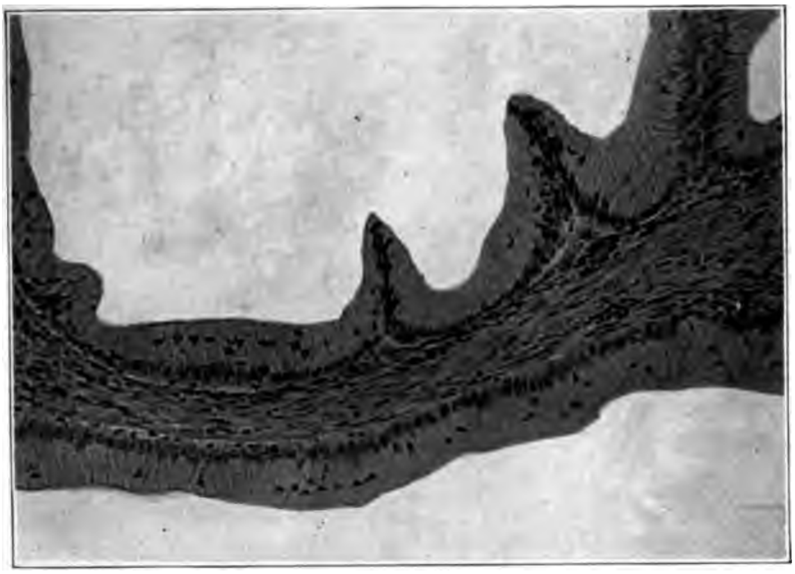


Fig. 838.—Pseudomucinous cyst of ovary. High power of Fig. 161, showing the typical cells lining a pseudomucinous cyst. Notice that the cells are very long, stain only lightly and the nucleus is placed at the base. Gyn. Lab.

There are goblet cells scattered here and there among the columnar cells. The cells are not ciliated.

The pseudomucinous cystadenomata are nearly always confined to the ovary of one side, being bilateral only very rarely. Such a cyst may start as a unicentral growth (giving one large cyst) or as a multicentral growth (giving two or more primary cyst cavities).

Pseudomucinous cysts very rarely rupture spontaneously.

They rarely form peritoneal metastases. The apparent peritoneal metastases that result from rupture of such a cyst or from contamination during removal are due simply to the persistence of groups of cells that have lodged on the peritoneum and secured temporary nourishment, and go on for a time producing pseudomucin. There is rarely any real growth or multiplication of the adherent epithelial cells. They usually live for a short time only and then disappear. Occasionally, however, there is multipication of these cells, and growth all through the abdominal cavity, giving rise to the condition known as "pseudomyxoma peritonei." The peritoneal cavity becomes filled with the pseudomucinous material, which is reformed again

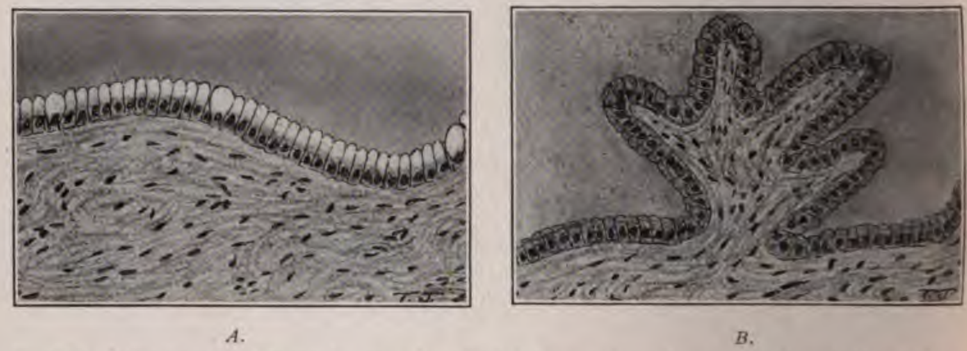

A. *B.*

Fig. 839.—Indicating the difference between the cells lining a pseudomucinous cyst (*A*) and those lining a serous cyst (*B*), as explained in the text.

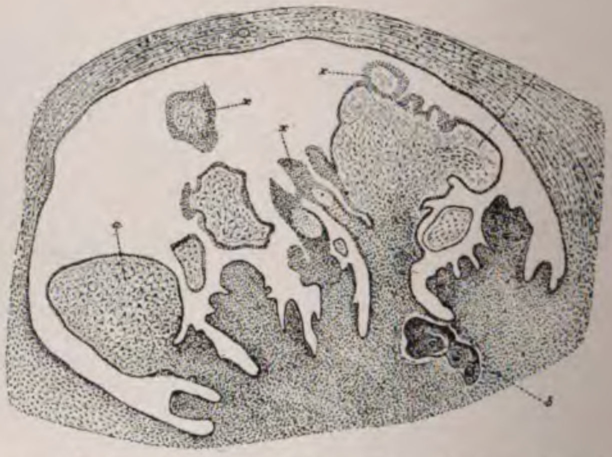


Fig. 840.—A papillary cystadenoma of the ovary. The papillary projections within the cyst grow to the opposite wall and then penetrate it. (Pfannenstiel—*Veit's Hand-Buch.*)

and again after removal. Most of these patients finally succumb to mechanical interference by the spreading pseudomucinous growth or to the secondary development of malignant disease.

Pseudomucinous cysts rarely undergo malignant change, except as above stated.

The cause of the pseudomucinous cyst is not known certainly. They probably start from the primordial follicles. This is indicated by the fact that in the small secondary cysts, in the wall of the main cyst, perfect ova have been found. These ova were formed after birth. According to accepted theories, the only cells in the ovary capable of forming ova after birth are

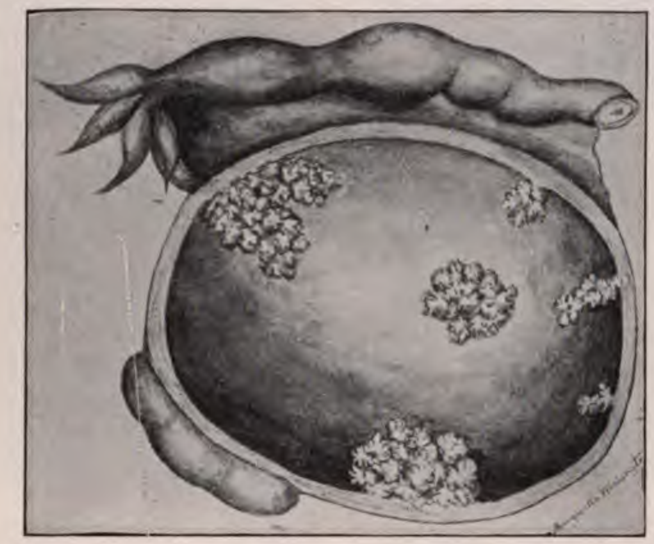


Fig. 841.—A papillary cystadenoma, sectioned and showing the papillary projections into the cyst cavity. (Penrose—*Diseases of Women.*)

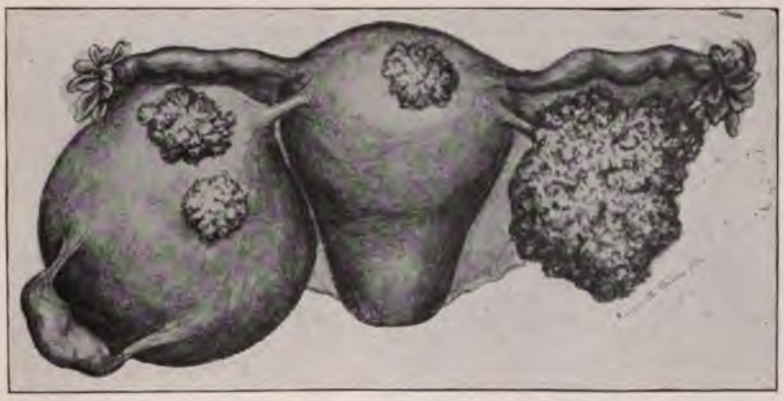


Fig. 842.—Papillary cystadenoma of each ovary. On the left side the internal papillary projections have grown through the opposite wall and appear on the external surface. On the right side the papillary growths have obliterated all resemblance to a cyst, and appear simply as a cauliflower growth in the region of the ovary. Note the metastasis on the peritoneal surface of the uterus. (Penrose—*Diseases of Women.*)

those of the primordial follicles. All the other cells have been differentiated past this stage.

Serous Cystadenomata.—This form of tumor is known also as "papillary cyst" and as "cystadenoma invertens." The contents of the serous cyst partake of the nature of serum and do not present the gelatinous character of that of the pseudomucinous variety. On chemical examination, the contents show a large amount of albumin and no pseudomucin. The contents of the serous cysts, like those of the other variety, may vary much in color and consistency—this variation being due to the amount of hemorrhage into the cyst. The cells apparently have no secretion, and consequently there is no marked intracystic pressure as there is in the pseudomucinous cyst. On account of this absence of internal pressure, the cells, as they proliferate, pile up, forming papillary projections into the interior of the cyst (Figs. 839-B to 845); hence the name "invertens." These papillary masses (consisting of a layer of epithelial cells and some stroma), when they come in contact with the opposite wall of the cyst, penetrate the wall and appear outside as papillary growths on the external surface of the cyst (Figs. 840 to 843).

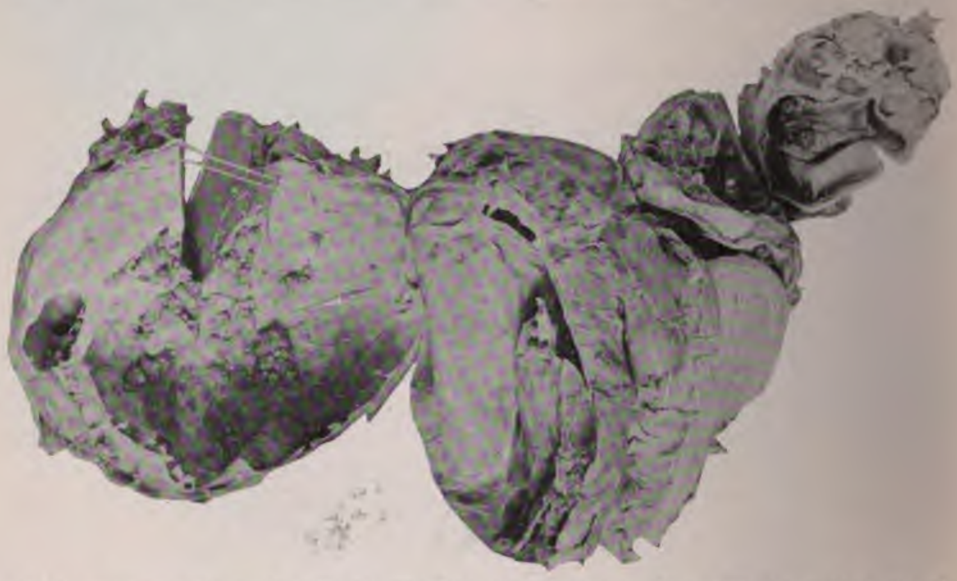


Fig. 843.—A case of bilateral proliferating papillary ovarian cystoma. The papillary growth is distinctly visible on the larger tumor to the left. Gyn. Lab.

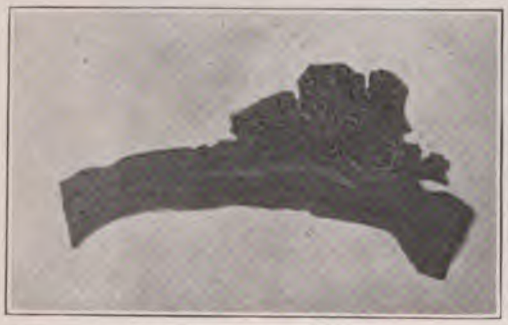


Fig. 844.—Wall of a benign serous papillary cyst. These projections are covered with epithelial cells that have no tendency to pile up or invade. Gyn. Lab.

Usually a few gland-like eversions may be found in the wall, but they are insignificant. Occasionally, however, a serous cystadenoma will present

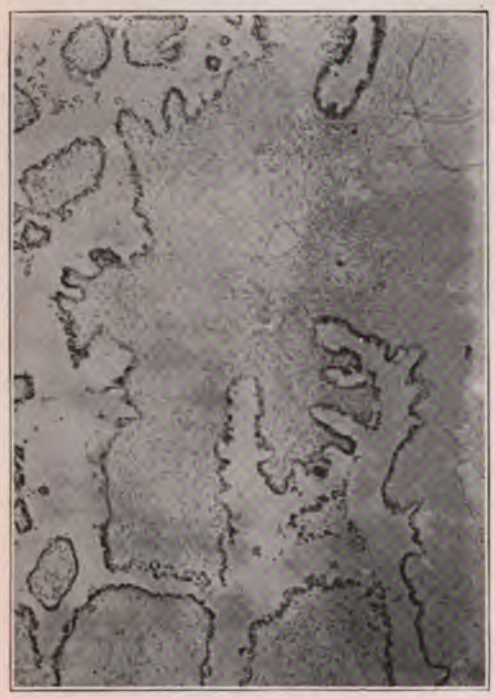


Fig. 845.—Benign papillary cyst. High power, showing the characteristic structure of the benign type. Gyn. Lab.

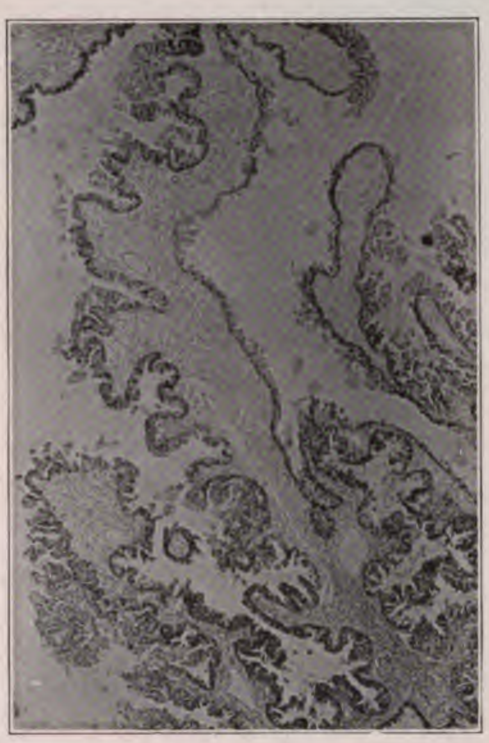
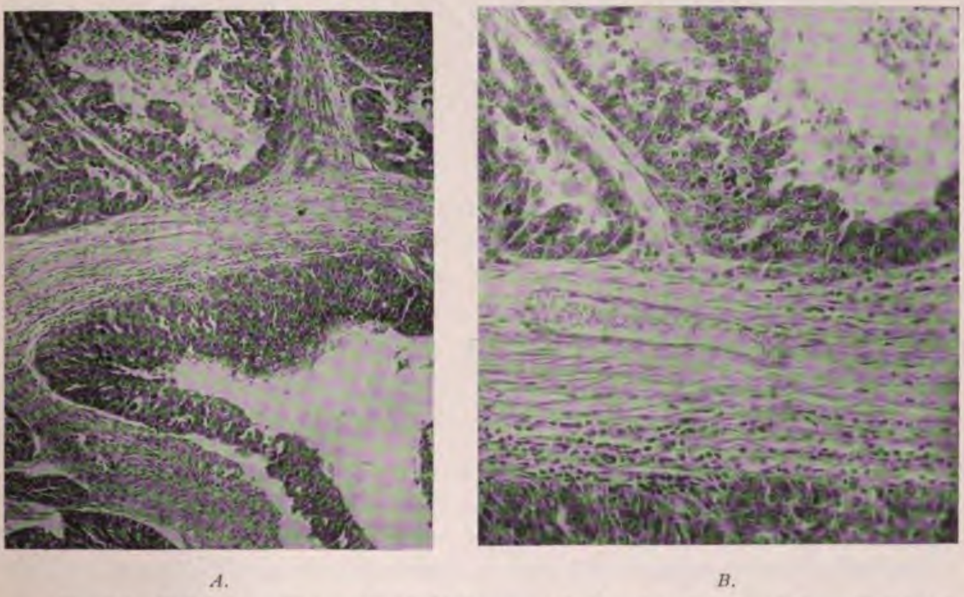


Fig. 846.—Malignant papillary cyst, showing the marked piling up of the lining cells and their definite invasion into the connective tissue stroma. Gyn. Lab.



A. *B.*

Fig. 847.—Malignant papillary cyst. *A.* High power, showing the piling up of the epithelial cells and other characteristics of malignancy. *B.* Still higher power of the left central area in Fig. 847, showing the individual cell characteristics. (Erdmann and Spaulding—*Surg., Gyn. and Obst.*)

nearly altogether evertent growths (gland-like projections into the wall of the cyst)—serous cystadenoma evertens.

The cells lining the serous cyst present the following characteristics:

They contain no pseudomucin, hence they stain throughout (Fig. 839-B).

There are no goblet cells—all plain columnar cells.

They have cilia.

A serous cystadenoma may start as either a unicentral or a multicentral growth. It does not form such a large tumor as the pseudomucinous cyst, and it is nearly always unilocular, except when it begins as a multicentral growth. Serous cysts are usually bilateral and in this they differ markedly from the pseudomucinous variety.

A striking feature of these serous cysts is that local metastases usually take place. When such a cyst ruptures, extensive local metastases form on adjacent peritoneal surfaces, producing papillomatous growths. These growths show no malignant structure, but they may kill the patient by extensive local growth, though they do not penetrate adjacent organs or cause distant metastases. They may, however, and in fact very frequently do, undergo malignant change, in which case they become ordinary carcinomata (Figs. 846, 847).

The origin of the serous cysts is not settled. Some authorities hold that they arise from the membrana granulosa of the graafian follicle. It is held by others that they arise from parovarium duct-remnants in the ovary, and there are some facts that tend to support this theory. In structure they resemble closely certain parovarion cysts, and remnants of parovarian ducts are found in the ovary near the hilum, which is just the part of the ovary from which these cysts apparently take their origin. Moreover, they differ from the common form of ovarian papilloma, which originates from the surface layer of epithelium (the germinal epithelium), though the term "ovarian papilloma" is sometimes applied to the papillomatous growth resulting from the early rupture of a serous cyst and in which the cyst character has largely disappeared.

The characteristics of the pseudomucinous and serous cysts may be presented and contrasted concisely as follows:

Pseudomucinous Cyst	**Serous Cyst**
1. Contents gelatinous and secreted by the cells lining the cyst—may be any color.	1. Contents serum-like and not secreted by the cells lining the cyst—may be any color.
2. Secondary growths consist of gland-like projections outward (evertent) from the cavity into the wall, forming small cystic cavities in the wall.	2. Secondary growths consist of papillary projections inward (invertent) from the wall into the cavity, forming papillary masses which extend across the cavity and penetrate the opposite wall.

3. Lining cells contain pseudomucin, are columnar, with some goblet cells, and are not ciliated.	**3.** Lining cells contain no pseudomucin, are plain columnar, without goblet cells, and are ciliated.
4. Usually unilateral.	**4.** Usually bilateral.
5. Rarely ruptures spontaneously.	**5.** Usually ruptures at an early stage, because of perforation of the wall by the papillary ingrowths.
6. Rarely causes peritoneal metastases.	**6.** Usually causes peritoneal metastases, consisting of widespread papillary growths.
7. Rarely undergoes malignant change.	**7.** Frequently undergoes malignant change.
8. Very common.	**8.** Not so common.
9. Cause unknown. Probably start from primordial follicles.	**9.** Cause unknown. Probably starts from parovarian tube remnants in the ovary.

Clinical Manifestations

Taking up the clinical manifestations of the proliferating cysts (both pseudomucinous and serous), it is found that they may **occur** at any age, but are most frequent during the period of greatest ovarian activity, i.e., between the twentieth and fiftieth years. Either ovary may be affected. They are bilateral in only about 3 per cent of the cases, while malignant tumors of the ovary are bilateral in about 75 per cent of the cases. As mentioned before, the serous or papillary proliferating cysts are usually bilateral, but they constitute only a small proportion of proliferating cysts—most of such cysts being of the pseudomucinous variety.

In **shape**, a proliferating cyst may be spherical and regular in outline, indicating a single large cyst, or it may be irregular, presenting nodules indicating a multilocular cyst. In **size** these cysts vary from a small tumor the size of an egg to a large tumor filling the whole abdomen.

As to **appearance** when exposed by abdominal incisions, the wall of the cyst presents a white, glistening appearance. The thinner portions are straw-colored or green or black, according to their fluid contents. The surface of the cyst may be perfectly smooth, or may be covered by a papillary growth, or may be bound to adjacent structures by adhesions. The tumor usually has a distinct pedicle.

The cysts are divided into three classes according to their **internal structure**—unilocular, multilocular and areolar. Unilocular cysts may be very large, but they are found to consist of only one large cyst. However, the interior frequently shows remains of trabeculae, indicating that they were at one time multilocular cysts. Multilocular cysts contain two or more cysts of medium size, besides a large number of smaller cavities (Fig. 835). Areolar cysts are made up of a large number of small cavities of various sizes and shapes.

The **cyst wall** consists of three layers—an outer and inner firm fibrous layer, with a middle layer of looser tissue between them. In the middle layer of loose connective tissue the vascular supply is distributed. Those vessels which come near the outer surface may often be plainly seen, and they are frequently very large. The external surface of the cyst wall is covered with columnar epithelium, derived from the germinal epithelium covering the surface of the ovary and differing from the endothelium of the peritoneum. The internal surface is lined with columnar cells. The lining membrane is often covered with vegetations and irregular growths, both cystic and solid.

The contents of cysts present marked contrast in consistency and in color. The contents may be thin like water (serous cysts), or thick and viscid and of gelatinous consistency (pseudomucinous cyst). The contents may be almost colorless or straw-colored or a dirty yellow, or green or black. The color depends on hemorrhage into the cyst. The coloring matter of the blood becomes the coloring matter of the cyst contents.

As these cysts enlarge they bear various **relations** to adjacent structures. If they rise out of the pelvis and enlarge in the abdomen, they may attain a very large size before producing serious symptoms. They there have plenty of room and expand freely, pushing aside the surrounding organs. If they become caught under the pelvic brim and develop in the pelvis, they soon begin to cause pain and other disturbances from pressure and distortion of the organs.

When the papillomatous growths within a cyst pierce the cyst wall (which happens most frequently in the serous cyst), peritoneal implantations may occur. In some cases these peritoneal implantations grow rapidly and fill the pelvis with papillary masses. In such a case the first impression, when the abdomen is opened, is that the pelvis is filled with a cancerous mass, which cannot be removed and which will soon cause death. Accordingly, in not a few cases, the operator, after scraping out some of the papillary bleeding growth, has closed the abdomen and told the patient or her friends that there was an inoperable cancer and that she could not long survive. Some such patients get entirely well after the operation. In other cases malignant change has already begun or begins later and the patient dies of carcinoma. In still other cases the growth itself becomes so extensive as to interfere with the functions of adjacent organs and thus causes death.

Dermoid Cysts of the Ovary

Dermoid cysts are those in which are found skin or mucous membrane, associated with structures generally connected with the epidermal tissues. The structures most frequently found are hair, teeth, bone, muscle-fibers, skin and small balls of sebaceous material resembling fat (Figs. 848 to 855).

Dermoid tumors may appear at any age. They have been found in children at birth and in women of ninety years.

Dermoid tumors of the ovary are comparatively small, rarely getting larger than a child's head. But they are more dangerous than the ordinary large cysts, for the dermoid cysts usually present more and firmer adhesions, and their contents are more irritating, so much so that the escape of any of the contents into the peritoneal cavity is likely to cause a fatal peritonitis. They are much more liable to suppuration and consequent abscess formation than the ordinary cysts. Quinby (Jour. Amer. Med. Assn., Oct. 4, 1919)

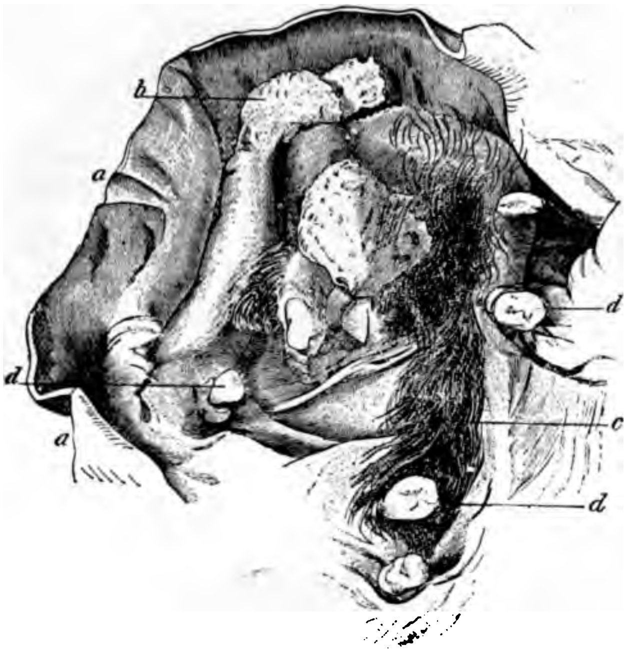


Fig. 848.—Portion of the wall of a dermoid cyst of the ovary. *a*. Wall of cyst. *b*. Mass of cutaneous tissue. *c*. Hair. *d*. Teeth. (Thomas and Munde, after Ziegler—*Diseases of Women*.)

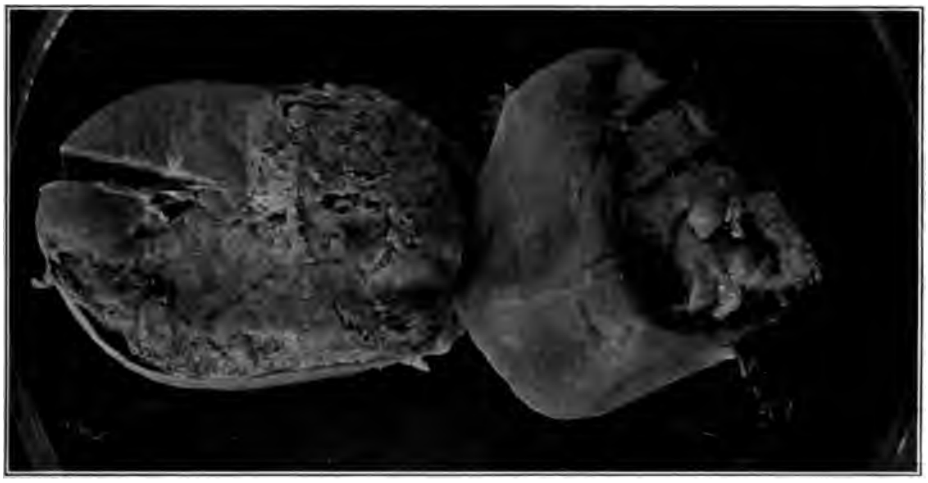


Fig. 849.—A small dermoid cyst, showing teeth, hair, sebaceous material and firm fat-tissue. The teeth, shown in the right side, are unusually well-developed and constitute a point of special interest in this specimen. (Courtesy of Dr. F. J. Taussig.)

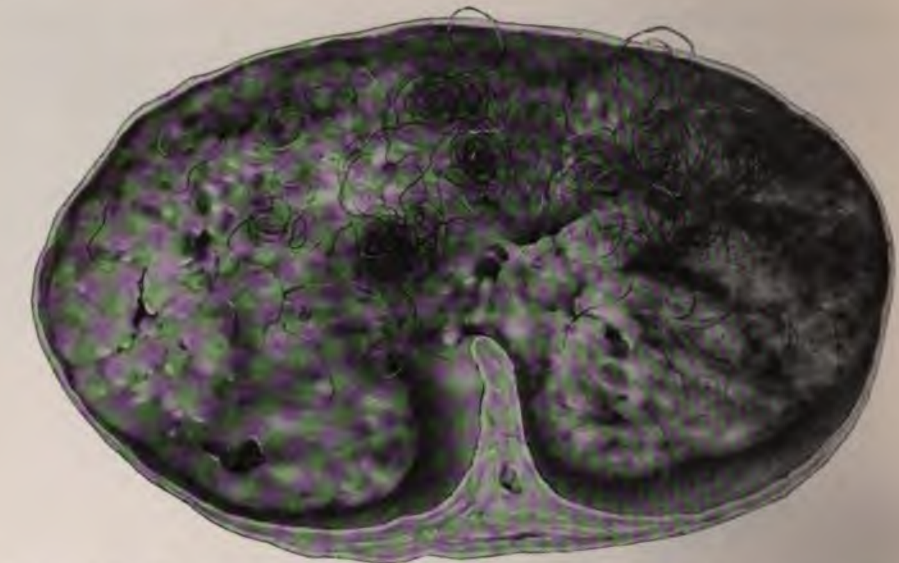


Fig. 850.—Drawing of a sectioned ovarian dermoid. Imbedded in the mass of sebaceous material are seen balls of hair. Gyn. Lab.

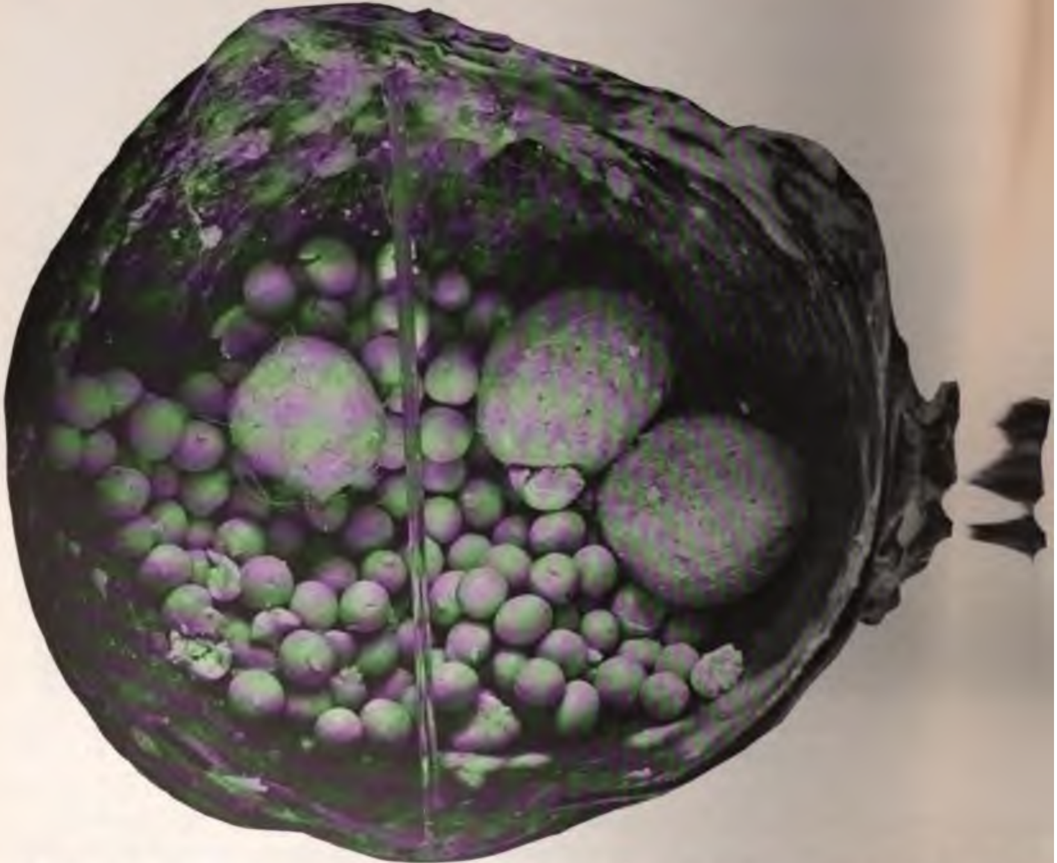


Fig. 851.—Dermoid cyst of the ovary. Photograph of the opened tumor and its contents. Gyn. Lab.

reports a dermoid of the ovary which ruptured into the bladder, and also a dermoid of the vaginal wall which caused bladder ulceration. Malignant degeneration, especially of the skin elements, occurs occasionally and must be kept in mind (Figs. 856 to 858).

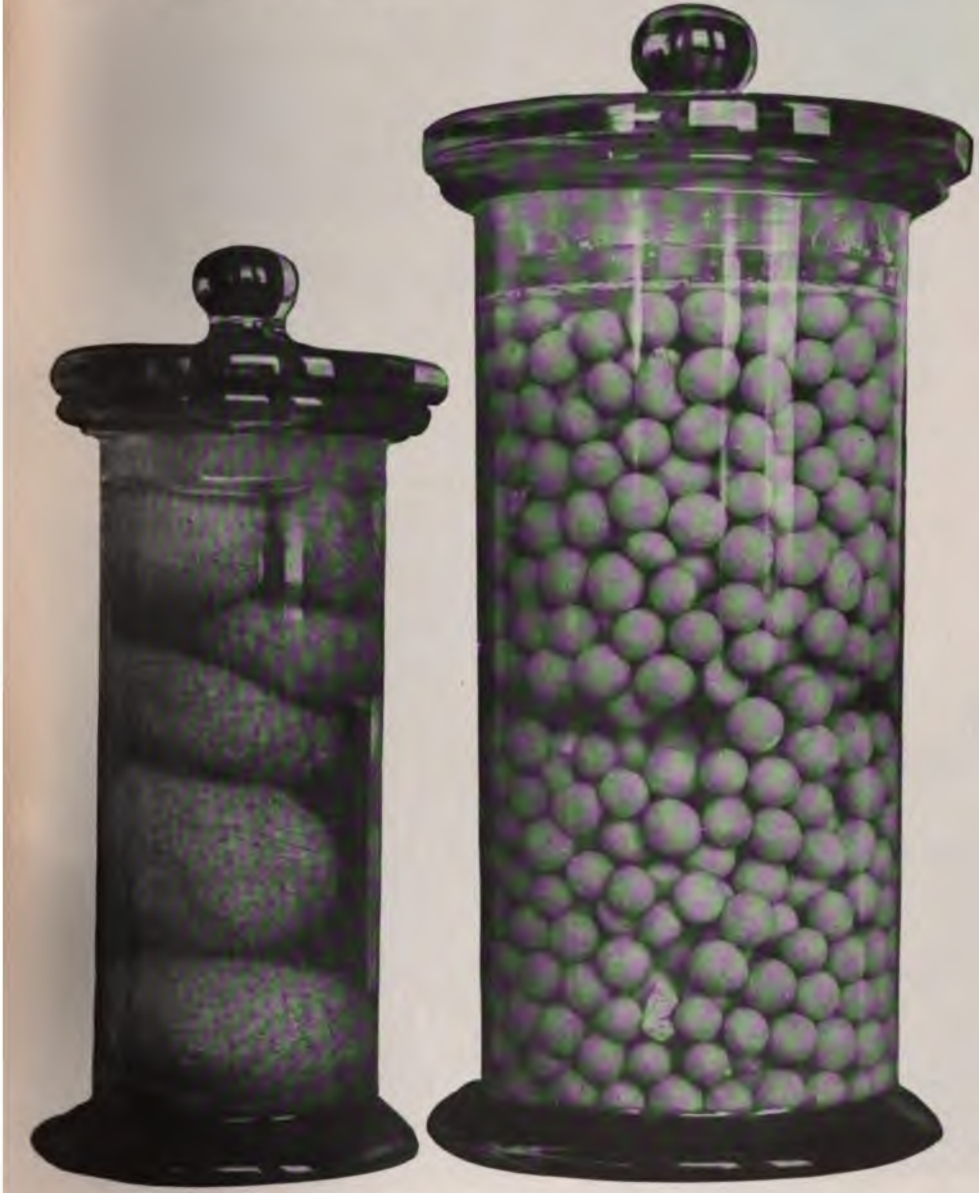


Fig. 852.—The contents of the dermoid cyst shown in Fig. 851. Gyn. Lab.

Endometrial Cysts of the Ovary

In his illuminating writings on uterine adenomyoma and the distribution f this type of growth in the pelvis and lower abdomen, Cullen called atten-ion to the fact that they occur occasionally in the ovary. The frequency of their occurrence in this situation and their great clinical importance was brought out by Sampson in a most instructive article (Arch. of Surg., Sept., 1921), in which he identified them with a certain type of hemorrhagic cyst of the ovary. It had long been noted that old blood was frequently found in small cysts of the ovary. Aside from the normal blood-filled corpus luteum (which undoubtedly constitutes some of the "blood cysts" removed by inex-

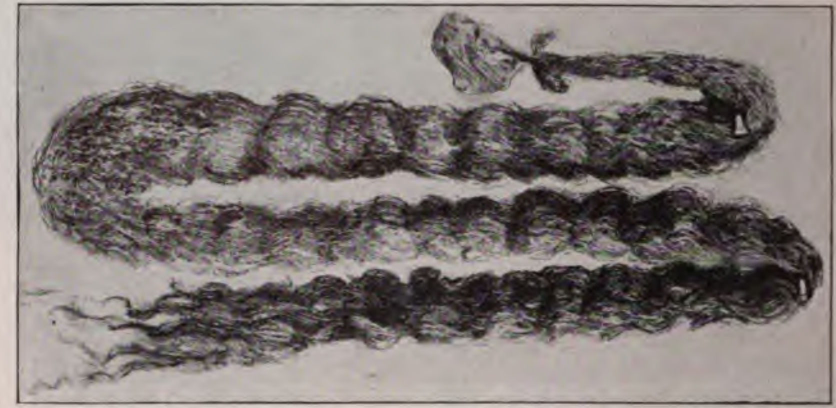


Fig. 853.—Hair, five and a half feet long, from a dermoid cyst. (Thomas and Munde—*Diseases of Women.*)

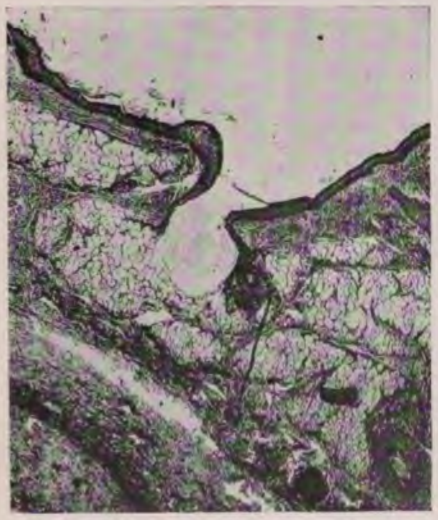


Fig. 854.—Microscopic section from the wall of a dermoid cyst, showing the thick layer of stratified squamous epithelium and sebaceous glands. Gyn. Lab.

Fig. 855.—High power of the wall of a dermoid cyst, showing squamous epithelium, sebaceous glands and hair follicles. Gyn. Lab.

perienced operators), blood from hemorrhage may be found in various types of cyst—the follicular cyst, the corpus luteum cyst and the ordinary proliferating cysts (pseudomucinous and serous). Sampson has shown, however, that there is a particular type of cyst in which the extrusion of blood into the cavity is a part of the regular development. This cyst is lined, or partly lined, by "endometrial" tissue, that is, by a tissue made up of glands and

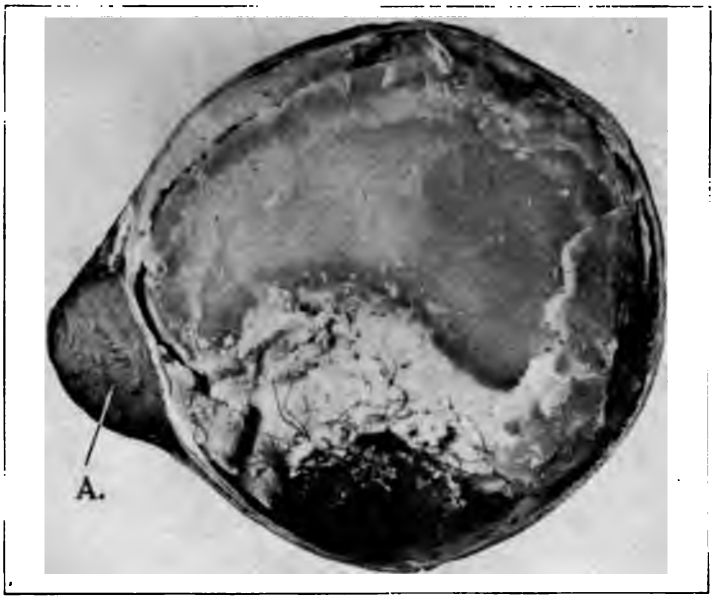


Fig. 856.—A dermoid cyst of the ovary showing beginning carcinoma at *A*. (Spalding—*Am. Jour. Obst.*)

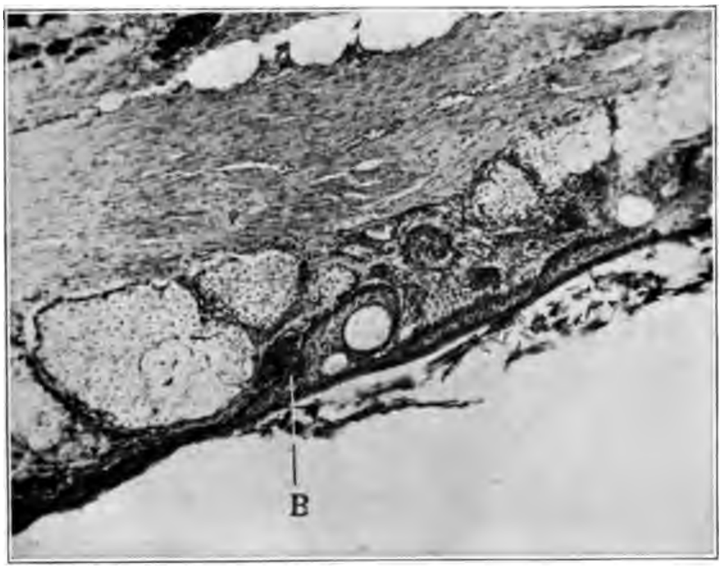


Fig. 857.—Microscopic section through area A in Fig. 856, showing the beginning carcinoma in the wall of the cyst. (See also Fig. 858.) (Spalding—*Am. Jour. Obst.*)

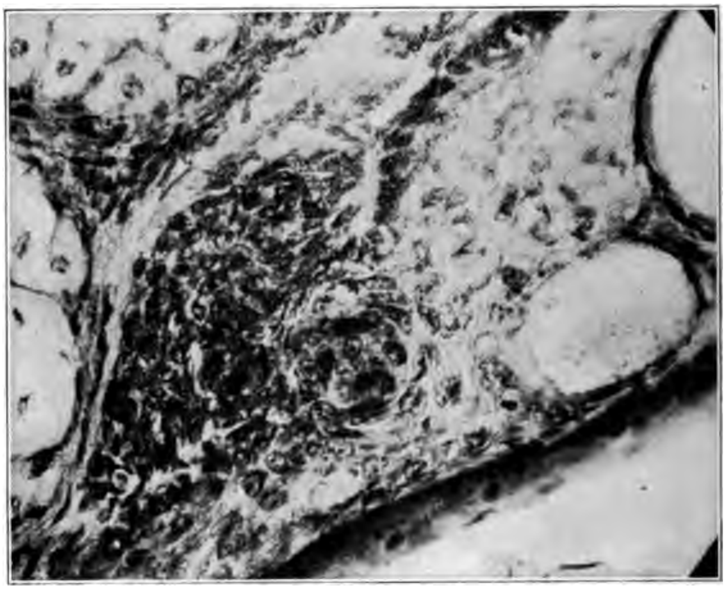


Fig. 858.—High power of the area B in Fig. 857, showing the focus of malignant cells. (Spalding—*Am. Jour. Obst.*)

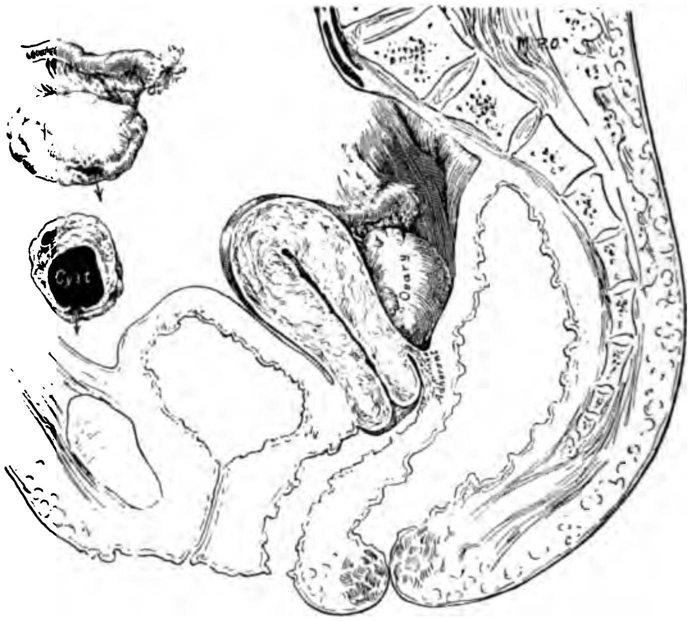


Fig. 859.—Endometrial cyst of ovary. The ovary is prolapsed and adherent. Perforation of the cyst wall has taken place, with gravitation of contents to the culdesac and the formation of adhesions there. The insert shows the ovary sectioned and, also, the perforation through the cyst wall and ovarian surface. (Sampson—*Archives of Surgery.*)

stroma exactly resembling the endometrium of the uterus. Not only does this tissue look like endometrium, but it acts like endometrium—it menstruates. Along with the uterine endometrium it passes through the regular phases of menstruation. Blood is extravasated into the tissue and passes into

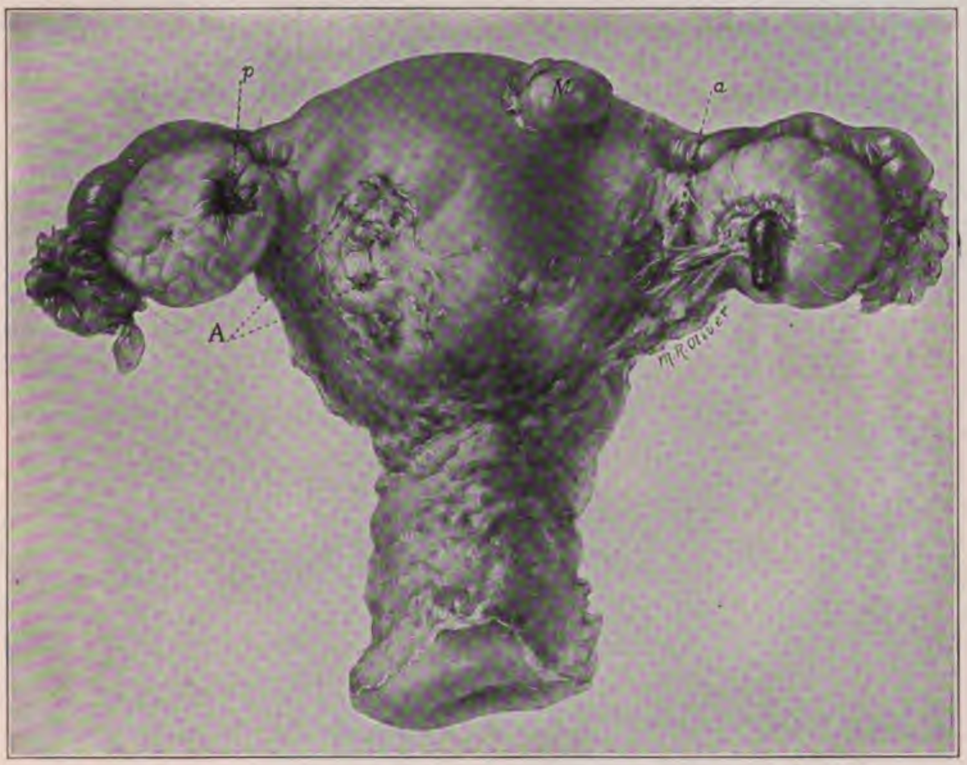


Fig. 860.—Endometrial cysts of ovary. A cyst in each ovary has perforated, and from the cyst in the right ovary the contents are leaking out. At operation both ovaries were found adherent to the posterior surface of the uterus. Where the left ovary was adherent (*A*) a superficial adenomyoma is developing in the uterine wall. (Sampson—*Archives of Surgery.*)

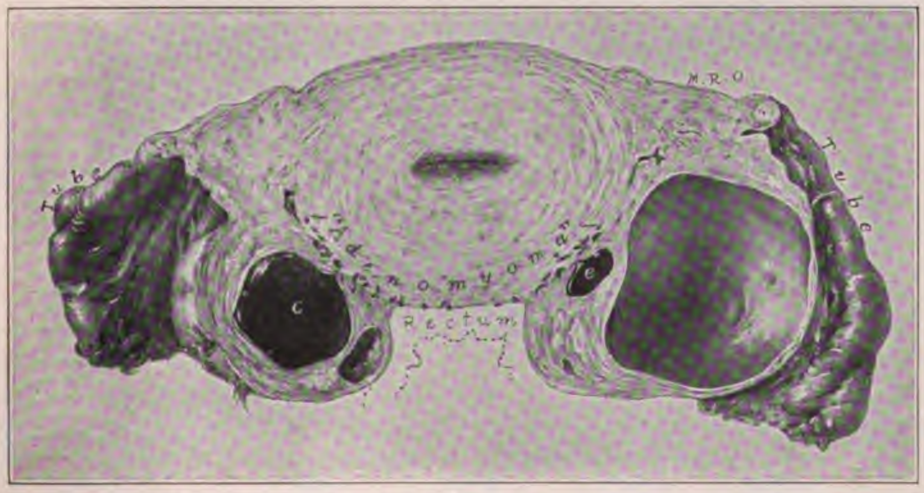
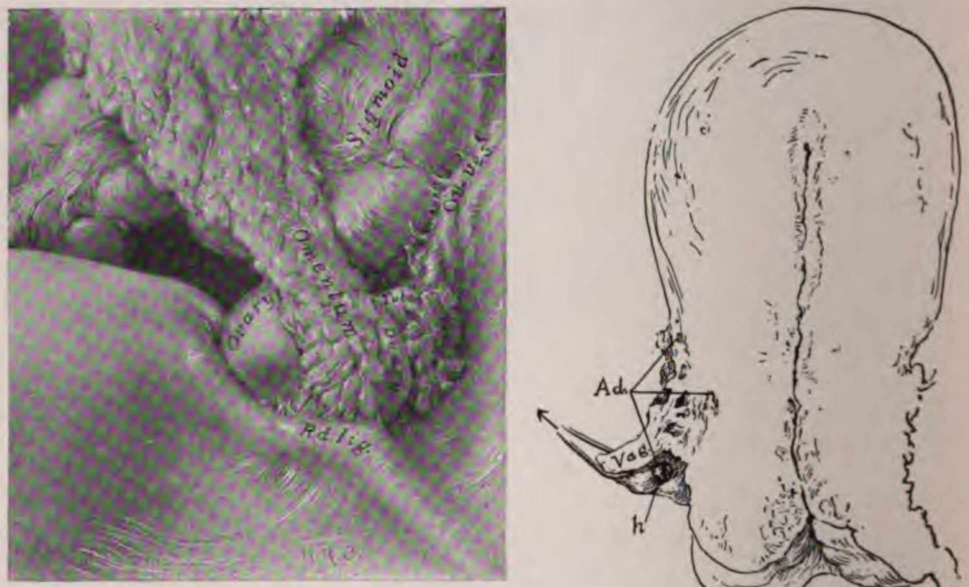


Fig. 861.—Endometrial cysts of ovary. Cross section of the uterus and ovaries indicating the condition found at operation. Both ovaries were adherent to the posterior surface of the uterus and the implanted endometrial cells have grown into the uterine wall, forming superficial adenomyoma. Sections of the uterine wall showed no endometrial tissue between this area and the normal endometrium. The larger cavity in the right ovary is a simple follicular cyst. (Sampson—*Archives of Surgery.*)

the cavity. In the closed cyst there is no outlet for this menstrual blood, so it accumulates and distends the cyst. The retained blood undergoes more or less disorganization, and constitutes the dark chocolate-colored material which so often escapes from the cyst as the adhesions are broken in operative removal.

The accumulating contents or the advancing growth of the endometrial tissue, or both, cause early perforation of the cyst wall and leakage of its contents. The escaping contents carry elements of the endometrial lining, which implant themselves on adjacent surfaces and grow into the walls of the organs—reproducing there endometrial tissue like the original. This results in dense adhesions of the affected ovary and cyst to adjacent structures. The leaking cyst-contents may gravitate to the posterior peritoneal culdesac, causing there dense adhesions from similar growth (adenomyoma of rectovaginal septum). Adhesions to the uterine wall take place, with resulting inward growth of the implanted endometrial elements. Thus originate certain of the outlying uterine adenomyomata. Early perforation with dense adhesion from implantation growths is a constant feature of these cysts. These dense adhesions involving the rectum or sigmoid or other structure, seriously complicate the operation for removal. The early perforation with adhesions and the chocolate-like contents are the striking clinical features of these cysts, and Sampson designates them as "perforating hemorrhagic cysts" and as "chocolate cysts."



A. *B.*

Fig. 862.—Endometrial cyst of ovary. *A*, A small cyst of the left ovary has perforated and become adherent high up to the round ligament. The omentum also is adherent over it. On separating the adhesions, dark chocolate-like fluid escaped. *B*, Section of the culdesac area in the same case. Gravitations of leakage material has caused an implantation adenomyoma at the bottom of the culdesac. A small, blood-filled cyst of this adenomyoma of the rectovaginal septum may be seen projecting into the vaginal cavity at the posterior vaginal vault. Compare with Fig. 626. (Sampson—*Archives of Surgery*.)

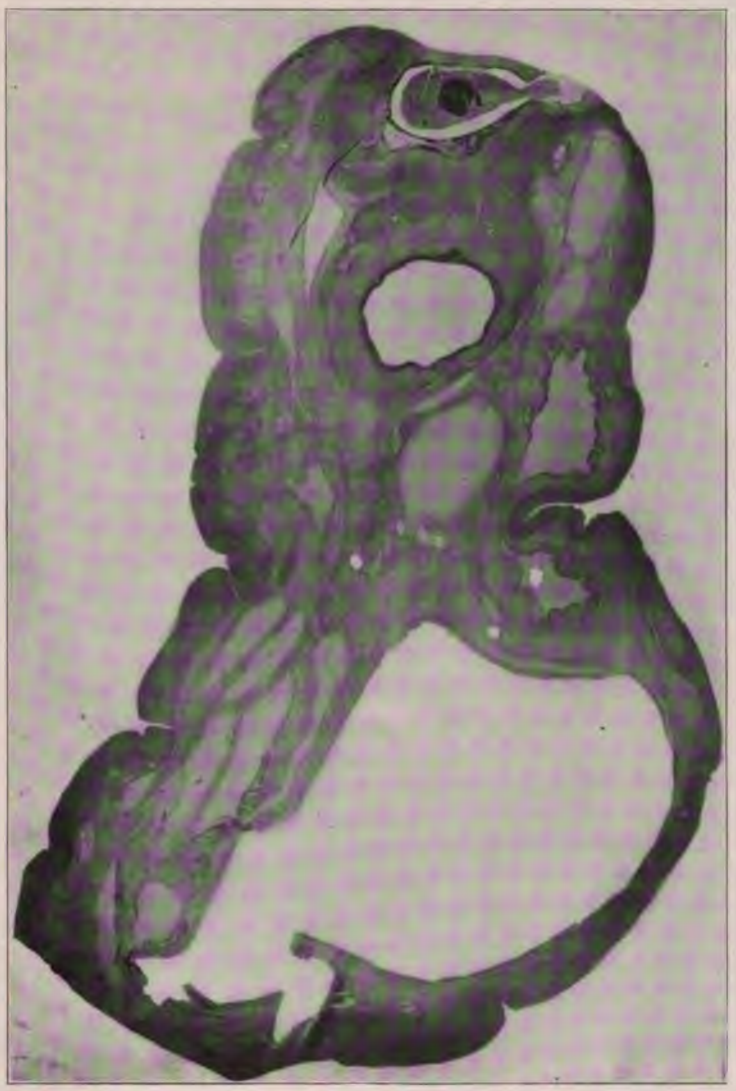


Fig. 863.—Endometrial cysts of ovary. Sections of the whole ovary. The large cavity in the lower half is a simple follicular cyst. Occupying the middle portion of the upper third of the ovary is the area of particular interest. It contains two small cysts imbedded in a mass of solid tissue which is well demarcated from the surrounding ovarian tissue. Further details are shown in Fig. 864. Gyn. Lab. (Schwarz—*Trans. Am. Assn. Obst. and Gyn.*)

A typical case of endometrial cyst is shown in Fig. 859. The ovary containing the small cyst is prolapsed and adherent. The small insert shows a section of the ovary and cyst, and also the site of perforation. The tendency to early perforation with the extensive formation of adhesions is shown in Fig. 860. Both ovaries may be affected (Figs. 860, 861). Though generally small, endometrial cysts are found at operation as large as the fist and larger. Adhesion to the posterior surface of the uterus and penetration of the uterine wall, forming an adenomyoma in that situation, is well shown in Fig. 861. The gravitation of leaking cyst-contents to the culdesac, with implantation, inward growth and adenomyoma formation, is shown in Fig. 862. The rôle of gravitation is especially clear in this case, in which the affected ovary and perforation are so high and far removed as to exclude growth by continuity of tissue in the culdesac implantation.

The microscopic characteristics of the endometrial cyst of the ovary are well shown in Figs. 863 to 865, from a case reported by Schwarz (Trans. Am. Assn. Obst. and Gyn., 1919). This form of ovarian cyst occurs frequently in women in the child-bearing period, especially after the age of thirty. Since working up the subject and watching for these cysts, Sampson has found that they constitute 12 per cent of the cases for which he has had to do an abdominal operation for pelvic disease in women between thirty and fifty years of age. In addition to the enlarging cyst, the progressive growth of the implants of endometrial tissue may produce serious consequences in sur-

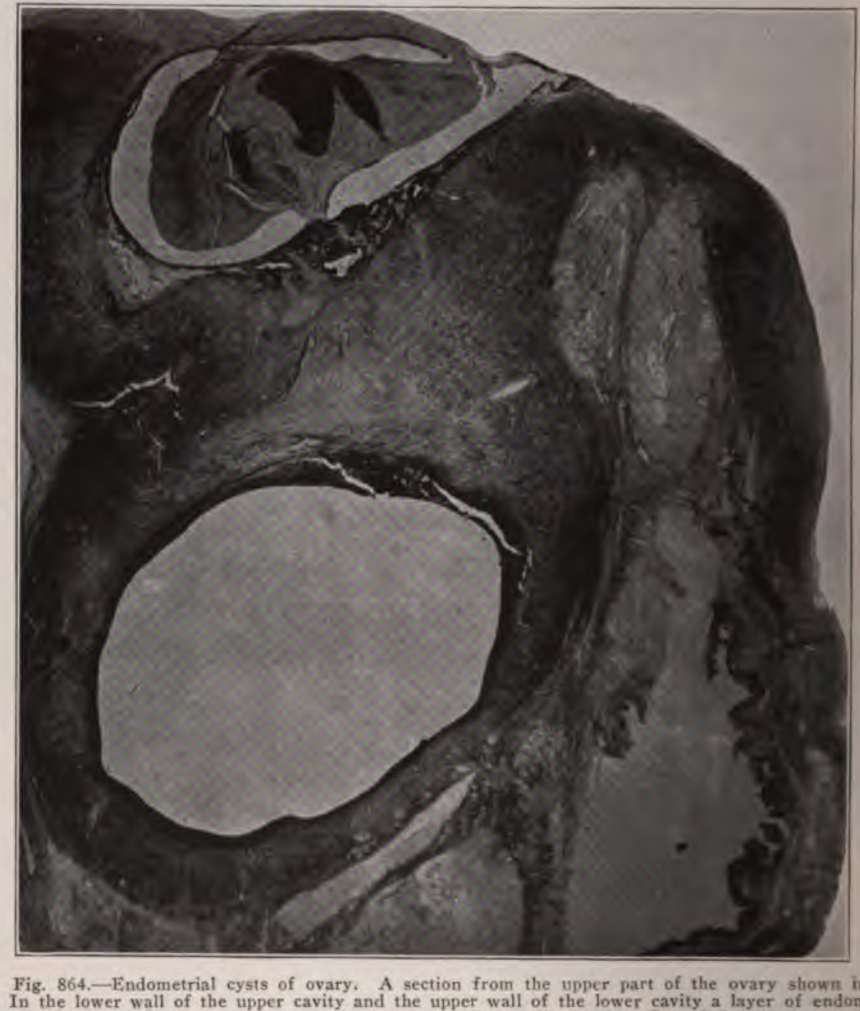


Fig. 864.—Endometrial cysts of ovary. A section from the upper part of the ovary shown in Fig. 863. In the lower wall of the upper cavity and the upper wall of the lower cavity a layer of endometrial tissue may be seen. In the upper cyst cavity blood and fibrin still remain. Gyn. Lab. (Schwarz—*Trans. Am. Assn. Obst. and Gyn.*)

rounding organs. Fig. 866 shows a case of culdesac implantation. The resulting adenomyoma of the rectovaginal septum spread to the parametrium and constricted the ureters, leading finally to the serious dilatation of each ureter as here shown. It is evident that these endometrial cysts of the ovary, though nonmalignant, constitute a serious menace to the patient. The treatment is operative removal, as far as that can be safely accomplished. As the trouble is frequently bilateral, removal of both ovaries is indicated, except where there is some special reason for not doing so. The removal of both ovaries has also a beneficial effect in checking the activity of the accompanying implantation adenomyomata, by removing the recurring menstrual stimulus. If after operation the activity continues in irremovable portions of the adenomyomata, deep x-ray therapy or radium treatment is indicated as in other forms of myoma.

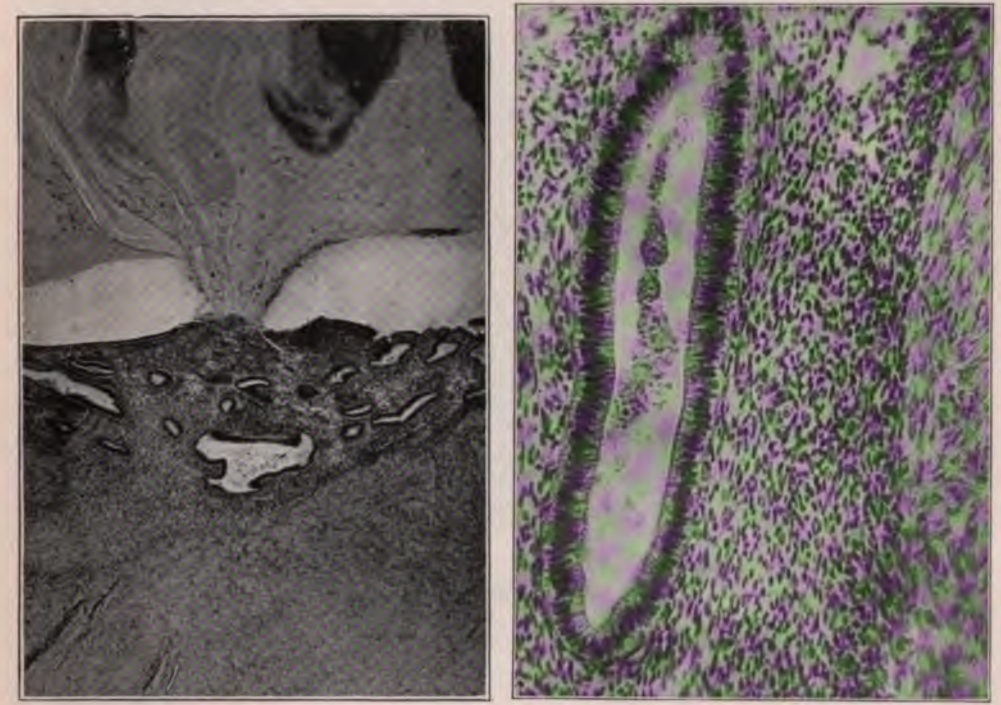

A. *B.*

Fig. 865.—Endometrial cyst of ovary. *A*, High power from the lower wall of the upper cyst in Fig. 864, showing typical uterine glands and stroma. *B*, Higher power, showing details of a gland and the surrounding stroma. The solid tissue about the two cysts (see Figs. 863 and 864) is apparently uterine muscle, making a true adenomyoma. A narrow strip of this muscle tissue is shown at the right edge of this high power photomicrograph. Gyn. Lab. (Schwarz—*Trans. Am. Assn. Obst. and Gyn.*)

SYMPTOMS AND DIAGNOSIS

of Ovarian Cysts

As the simple cysts seldom give rise to serious trouble and the dermoid cysts are rare, the symptoms to be mentioned belong to the proliferating cysts and principally to the pseudomucinous variety, as the vast majority of cystic ovarian tumors belong to this class.

An ovarian cyst usually develops slowly and may attain considerable size before it is discovered. Often it is noticed then only by accident.

The earliest symptoms are a feeling of weight and pressure in the pelvis, bladder irritability, slight menstrual disturbance, constipation and perhaps some pain with bowel movement. The symptoms are not distinctive, but simply indicate some disturbing factor in the pelvis. As the tumor increases in size, distinct pressure-symptoms appear and the general nutrition becomes affected. There is enlargement of the abdomen, swelling of the feet from pressure on veins, pain from pressure on nerves and dyspnea from pressure on the diaphragm. There appear, also, stomach disturbances, emaciation and progressive weakness. In some cases there are attacks of local peritonitis, with severe abdominal pain and some fever, but these inflammatory symptoms are due to complications and do not belong to the natural history of the tumor.

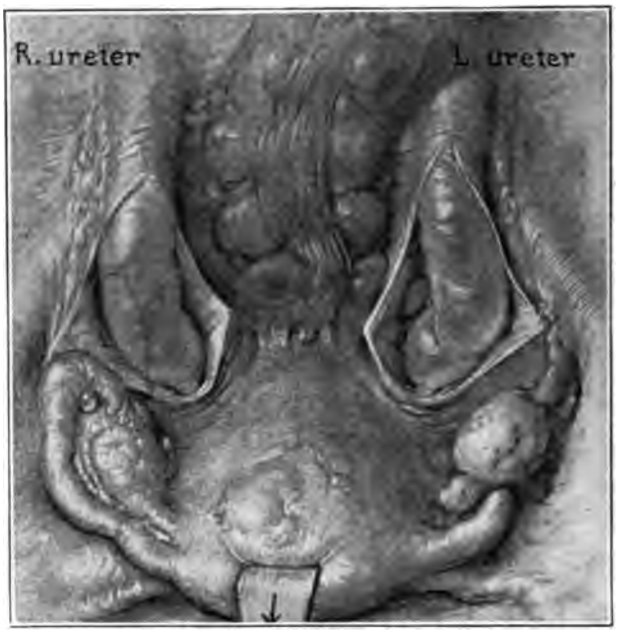


Fig. 866.—Remote results of an endometrial cyst of ovary. Patient aged 25, suffered at menstruation with pain in rectum and radiating down left thigh to knee. Trouble persisted. At operation, August, 1914, a cyst of left ovary size of an orange and filled with old blood was removed. Some blood free in cavity. (Cyst had evidently perforated long ago with the formation of implantation adenomyoma in culdesac.) Some temporary relief from operation, but in February, 1916, polypi appeared at the vaginal vault, connected with an induration in the rectovaginal septum. Polypoid masses were removed but recurred, and microscopic examination showed them to be adenomyomatous. Operation in November, 1916, revealed the condition shown in the above drawing. The adenomyoma of the rectovaginal septum had extended into the parametrium, constricting the ureters until they were both dilated as here shown. Uterus was removed but not all of the rectovaginal growth could be removed. Later radium treatment. Improvement. July, 1917, patient doing well, no pain in kidney regions. (Cullen—*Johns Hopkins Hospital Bull.*)

Ovarian cysts grow slowly, usually taking several years to reach a large size. But they seldom stop growing. They persistently enlarge until the patient finally dies from exhaustion brought about by pressure-effects on vital organs.

The diagnosis in typical cases is easy, but in complicated cases it may be very difficult, and in exceptional cases a positive exact diagnosis is impossible before operation. Tapping the cyst through the abdominal wall as an exploratory measure should not be employed. An adherent coil of intestine may be punctured, or cyst contents may leak into the peritoneal cavity and cause fatal peritonitis. In a doubtful case, an exploratory abdominal section is safer and far more satisfactory in diagnostic results.

In taking up the differential diagnosis of ovarian cysts, it is at once apparent that the symptoms and diagnostic points are different in the different-sized tumors.

Small Ovarian Cyst

Considering the small ovarian cyst according to the seven principal diagnostic points in the palpation of pelvic masses (position, size, shape, consistency, tenderness, mobility, attachment—see bimanual examination of corpus uteri and other pelvic masses, Chapter I), it is found that an ovarian cyst of this size presents the following characteristics:

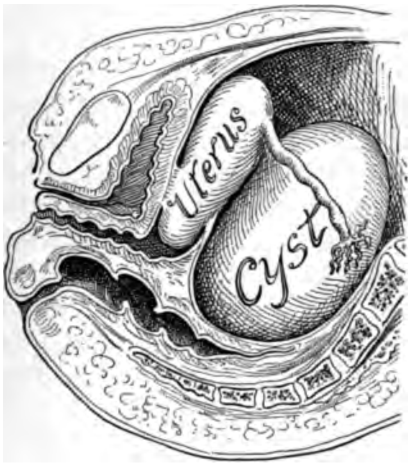


Fig. 867.—An ovarian cyst lying back of the uterus. (Ashton—*Practice of Gynecology.*)

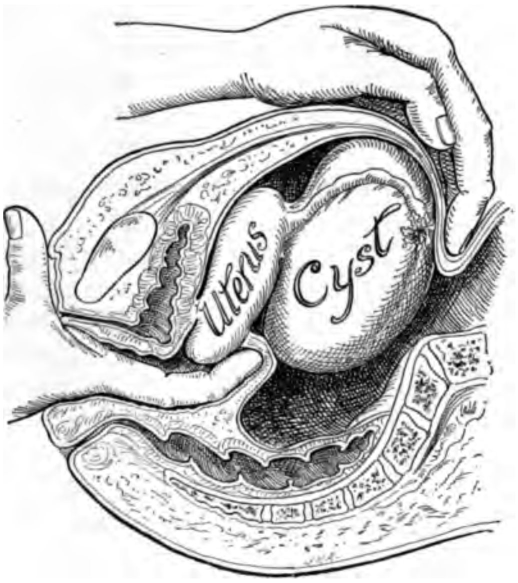


Fig. 868.—Showing the method of testing the mobility of such a mass. (Ashton—*Practice of Gynecology.*)

1. Is situated in the lateral part of the pelvis, though in exceptional cases it may drop down directly behind the uterus or in front of it.

2. The small ovarian cyst is the size now under consideration—about as large as the fist or a little larger.

3. Is approximately spherical, though may be made uneven by secondary cysts.

4. Contains fluid (fluctuates).

5. Is not tender, unless complicated by inflammation or by torsion of pedicle.

6. Is freely movable, unless complicated by adhesions or caught under the sacral promontory (Figs. 867, 868).

7. Is attached in the lateral part of the pelvis. Apparently arises from the tubo-ovarian region. Lies beside the uterus, but is not attached to it and does not ordinarily modify it in any way, except to cause some displacement towards the opposite side.

If the cyst is uncomplicated, there is no history of pelvic inflammatory attacks—that is, the mass has progressed to its present size independent of inflammation or hemorrhage, which identifies it at once as a new growth.

The following conditions may be confounded with a small ovarian cyst and must therefore be taken into consideration in the **differential diagnosis:**

a. Salpingitis with exudate.
b. Pyosalpinx.
c. Hydrosalpinx.
d. Tubal Pregnancy.
e. Fibroid Tumor of the Uterus.
f. Retroverted Pregnant Uterus.
g. Broad Ligament Cyst.

a. **Salpingitis with Exudate** presents a mass which is (1) situated in the tubo-ovarian region, (2) irregular in shape, (3) firm, (4) very tender, (5) fixed by adhesion, (6) attached to both the pelvic wall and the uterus, (7) apparently originates in adnexal region and is attached to the upper lateral part of uterus, but a sulcus can be made out between the uterus and the mass. The uterus is fixed, but not otherwise modified except perhaps somewhat displaced to the opposite side. There is discharge from the uterus due to the preceding endometritis. The tube and ovary are included in the mass, which is adherent to the pelvic wall. There may be a mass about the opposite tube. There is fever if the trouble is acute, and there is a history of sudden onset, with pain in the lower abdomen and fever and confinement to bed following labor or miscarriage or instrumentation or gonorrhea. There have been remissions and exacerbations, with pelvic pain and disability and menstrual disturbance (usually painful menstruation) and leucorrhea. There has been some disability all the time and usually confinement to bed for a few days or longer during the exacerbations. Any increase in size is accompanied by inflammatory symptoms. If the patient is examined under anesthesia, it is found that the mass occupies the region of the tube and, usually, includes the ovary also. It is firm throughout, is fixed by adhesions, it attached to surrounding organs. The mass can be differentiated from the uterus, but not from the tube and usually not from the ovary. The uterus is normal except for the leucorrheal discharge and the fixation, and perhaps some displacement towards the opposite side.

b. **Pyosalpinx** presents practically the same symptoms and signs, except that the one or more points of fluctuation are present and the tenderness is more marked, and the inflammatory symptoms and exacerbations are more severe.

c. In **Hydrosalpinx** the inflammatory symptoms have practically disappeared, leaving the distended fluctuating tube with some adhesions. It differs from the ovarian cyst in that (3) the mass in typical cases is elongated and "sausage-shaped," (6) is less movable than the ovarian tumor, (7) is attached to the pelvic wall and to the uterus, though in some cases the attachment is not very close, and appears to arise from all along the upper margin of the broad ligament. The tube is included in the mass, while the ovary can in some cases be differentiated. There is a history of previous pelvic inflammation, with menstrual disturbance and other evidence of inflammation in the uterus. If the patient is examined under anesthesia, it may be possible to determine definitely that the tube is involved in the mass and that the ovary is separate.

d. **Tubal Pregnancy** presents the pain, disability, tenderness and fixation of an inflammatory mass, with little or no fever, but with the addition of the special evidences of extrauterine pregnancy given in the previous chapter.

e. **Myoma** of uterus presents a mass which differs from an ovarian cyst in that it is (1) situated near the center of the pelvis, (3) irregular in shape, (4) firm throughout, or if it is a cystic fibroid the larger part of the mass is firm, (6) not movable separately from the uterus, but the mass and the uterus are movable in the pelvis, (7) attached to the uterus, apparently arises from the uterus, and is so intimately associated with the uterus that it seems to be part of the organ. The uterus is usually displaced somewhat by the mass, increased in size, irregular in shape and presents some discharge from the accompanying endometrial disturbance. There are likely to be other masses projecting from the uterus and there is a history of menstrual disturbance (usually excessive menstruation), leucorrhea, and pressure and aching in the pelvis. If the patient be examined under anesthesia, it is found that the mass is intimately associated with the uterus and that the tubes and ovaries are separate, unless the mass is so large as to obscure these structures.

f. **Retroverted Pregnant Uterus** would cause confusion in diagnosis only when incarcerated in the pelvis so that it could not be raised sufficiently to be brought forward or satisfactorily outlined. It would then differ from an ovarian cyst in that the mass is (1) situated in the median line, (4) partly solid, but may be soft in spots, (5) tender, (6) not movable, (7) filling posterior part of pelvis and seems to be a continuation of the cervix uteri. There is softening of the cervix and corpus uteri and venous discoloration of the cervix and vagina. There is a history of amenorrhea, morning sickness and pains and tenderness in the breasts. If the patient is examined under anesthesia, the mass is identified with the uterus (enlarged, softened, retroverted and containing fluid), and the tubes and ovaries are distinguished as separate, unless the mass is so large that it obscures them.

g. **Broad Ligament Cyst** differs from the ovarian cyst in that it is (1) situated deeper in the pelvis, (6) not so movable, (7) attached to pelvic wall and uterus, originates in the lateral pelvic region and extends down the side of the uterus toward the cervix. It displaces the uterus markedly toward the opposite side and fixes the uterus to some extent. If the patient be examined under anesthesia, it is found that the mass is located in the broad ligament below the tube, and the tube and ovary can be distinguished as separate, unless obscured by the mass.

In connection with the differential diagnosis of small ovarian tumors attention should be called to certain swellings of the ovary which come and go periodically. The diagnostic confusion caused by such a swelling is well set forth by Ries (Jour. Am. Med. Assn., July 12, 1919) under the heading "The Tumor which Disturbs the Peace of the Community."

"The patient consults Dr. A. in regard to certain pains in the abdomen, with or without much menstrual disturbance. The physician tells her she has an ovarian cyst on the right side and should have it operated on. After a few days, the patient consults Dr. B for confirmation of the diagnosis. He examines her and assures her that there is no tumor at all. The patient is now thoroughly disturbed and seeks the advice of a third physician, Dr. C. He examines her and tells her that she has an ovarian cyst; that it is not, however, on the right side, but on the left side. The amount of ill feeling created between practitioners themselves and their patients by such an occurrence may readily be imagined. In a case of this kind, which came under my observation three years ago, I advised the patient to have no operation for the time being and she is still alive and well. Through previous observation of such cases, I was able to treat the patient conservatively and my colleagues with sympathy who had made diagnoses differing from my own."

In the article he gives his observations upon a number of these cases and concludes that the condition is generally an unusual form of corpus luteum in which the cystic feature varies greatly in size, bearing a relation to menstruation.

Large Ovarian Cyst

A growth large enough to cause the abdomen to be prominent (Figs. 869, 870) must be differentiated from the following conditions:

a. Tympanites and "Phantom Tumor."
b. Obesity.
c. General Ascites.
d. Pregnancy (normal, with hydramnios, extrauterine).
e. Cystic Fibroid of Uterus.
f. Distended Bladder.
g. Tumor of some Abdominal Organ.
h. Tuberculous Peritonitis.

a. **Tympanites** presents resonance over all the abdomen. The vagino-abdominal examination shows that there is no abnormal mass in the pelvis or lower abdomen. "Phantom tumor" is a term applied to certain conditions produced by irregular contraction of the abdominal muscles (forcing tympanitic intestines into some locality in such a way as to give the appearance of a tumor), accompanied with marked hyperesthesia. It occurs usually in hysteric subjects and the apparent tenderness may be so marked as to prevent satisfactory palpation, either abdominal or bimanual. Usually it can be made out that there is distinct resonance over the swelling and that there is no abnormal mass in the pelvis. When in doubt, examine the patient under anesthesia, when the muscular tension and the consequent "tumor" will disappear.

b. **Obesity** may produce marked prominence of the abdomen and has been mistaken for ovarian cyst (Fig. 876). Resonance may be obtained in deep percussion over all the abdomen, showing that there is no mass between the intestines and the abdominal wall. Also, in picking up the wall to test its thickness (Figs. 37, 38) it is found that most of the prominence is due to the thickness of the wall. On vaginoabdominal examination no abnormal mass is felt in the pelvis or lower abdomen.

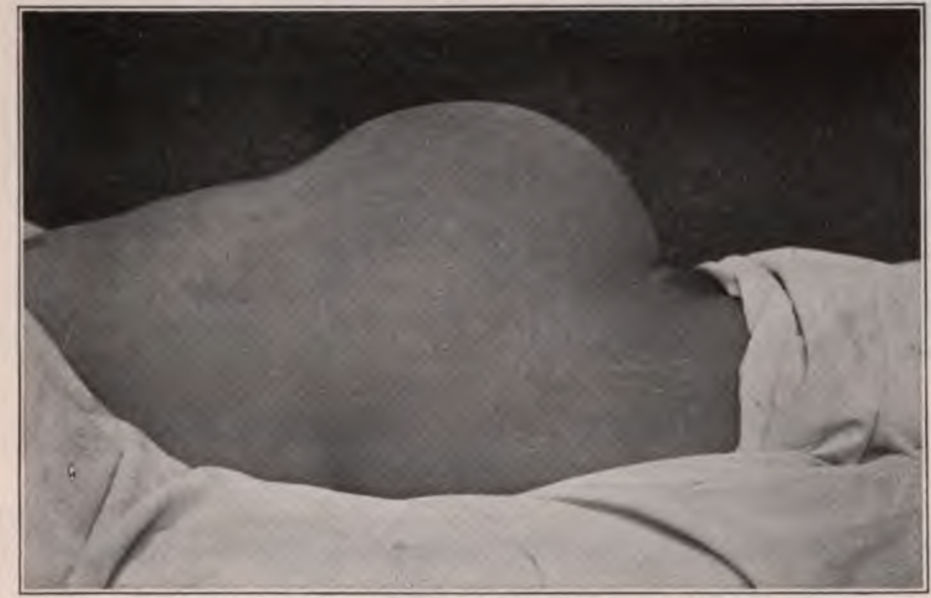


Fig. 869.—Patient with a large ovarian tumor.

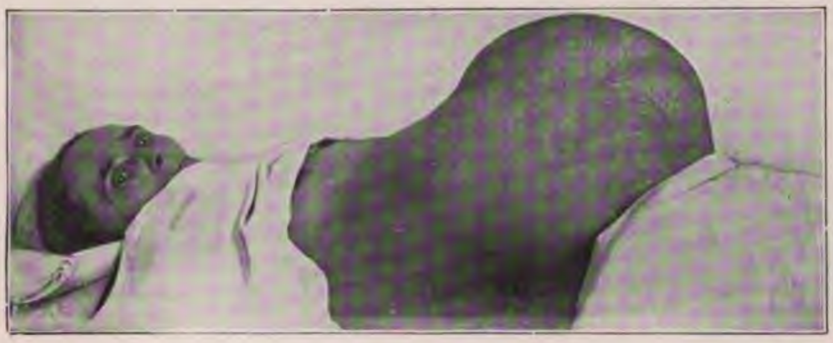


Fig. 870.—Another case of large cystic tumor. Here the tumor (an ovarian cyst) is extremely large and the rise of the abdominal wall at both lower and upper portions is very abrupt. (Bovée—*Practice of Gynecology*.)

c. **General ascites** presents ordinarily, when the patient is lying on her back, resonance at the top of the abdomen and dullness in the flanks (Figs.

47 to 50). Occasionally, however, the amount of fluid is so great that there is dullness even about the umbilicus (Figs. 871 to 875). When the patient changes posture the outline of dullness changes, as the free fluid goes to the lowest part of the peritoneal cavity. There is a percussion wave in ascites (Figs. 40, 41). Vaginoabdominal examination shows that there is no mass in the pelvis or lower abdomen. The presence of disease of the heart or liver or kidneys sufficient to account for the ascites is a point in favor of the same.

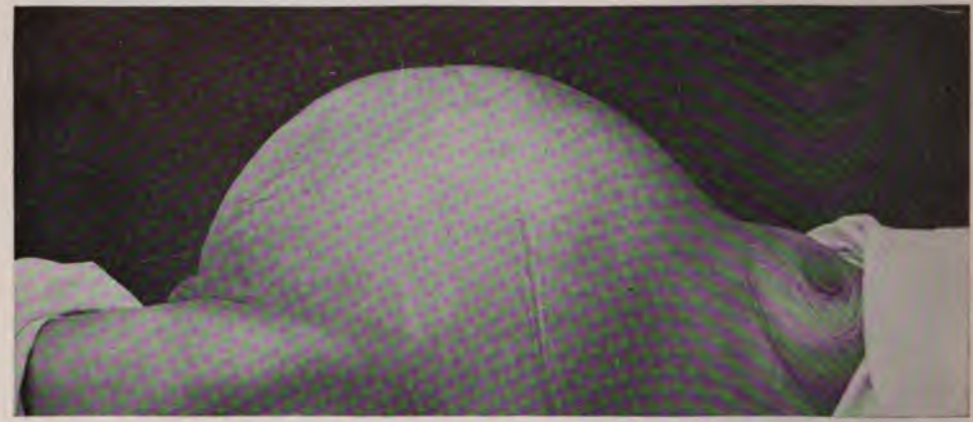


Fig. 871.—Extreme ascites. In the patient from which this photograph was taken, the abdomen was so distended with fluid that the wall was raised higher than the mesentery would permit the intestine to float, giving dullness about the umbilicus as well as elsewhere (see Fig. 872). The rise of the wall from below is rather abrupt. There is also edema of the wall, as shown by the persisting groove where the skirts were tied about the waist.

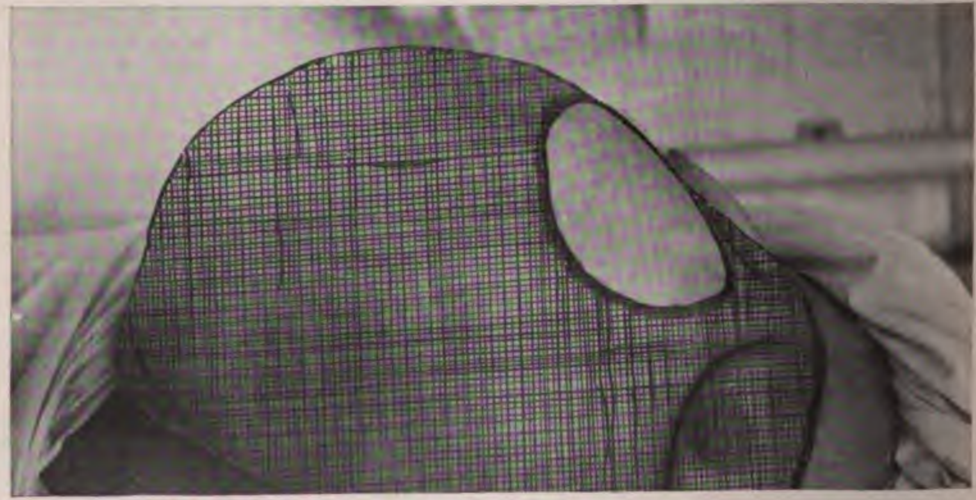


Fig. 872.—A case of extreme ascites. Same patient as in Fig. 871. Showing the area of dullness when the patient is on her back. The light area is all that is resonant.

d. **Pregnancy.—Normal pregnancy** presents missed menses, morning sickness, enlarged breasts, vaginal and cervical discoloration and softening of the cervix. The examiner can usually distinguish the fetal parts and may be able to feel fetal movements or hear the fetal heart sounds. In pregnancy with

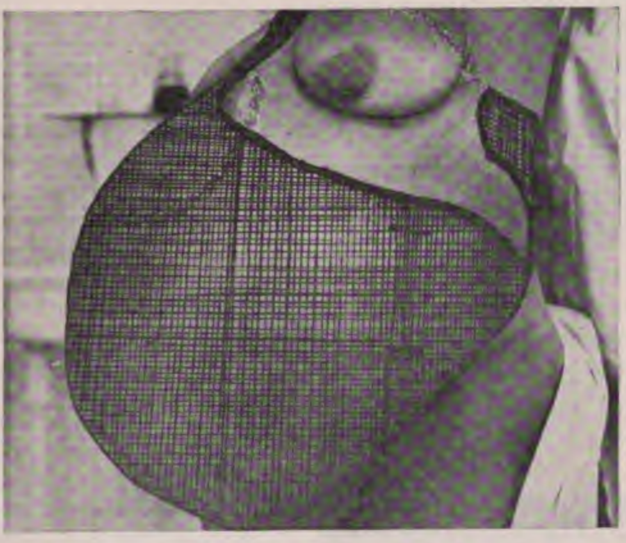


Fig. 873.—Extreme ascites. Area of dullness with patient standing. Same patient as shown in Fig. 872. Notice the marked change in the resonant area. The upper limit of the dullness is now almost horizontal.

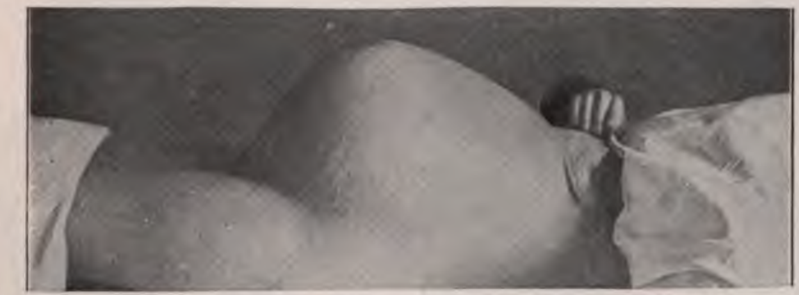


Fig. 874.—Another case of extreme ascites, giving dullness about the umbilicus as well as in the flanks. Notice the markedly pyramidal form of this abdomen. (Hirst—*Diseases of Women.*)

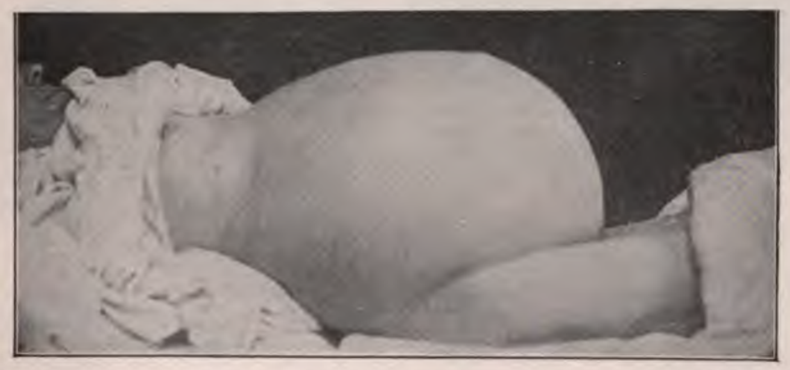


Fig. 875.—Another case of extreme ascites, giving dullness about the umbilicus and showing a very abrupt rise of the abdominal wall below. (Hirst—*Diseases of Women.*)

hydramnios the symptoms and signs are about the same as in normal pregnancy, except that there is more fluid, and consequently it is the more difficult to feel the fetus or to get the fetal heart sounds. In **extrauterine preg-**

nancy there are the usual symptoms of pregnancy, with the addition of certain anomalous symptoms, indicating that the pregnancy is in the peritoneal cavity instead of within the uterus. Also, in the early history of the trouble there are indications of pelvic inflammation, with the added special characteristics of tubal pregnancy enumerated in the preceding chapter.

e. **Cystic Fibroid.**—This presents an irregular mass situated in the central part of the pelvis, and apparently it arises from or is a part of the uterus, from which it cannot be separated. A large part of the mass is firm. It distorts the uterus and increases the length of the cavity. There is usually a history of excessive menstruation and of leucorrheal discharge.

f. **Distended Bladder.**—It has happened that a distended bladder went unrecognized until rupture of the bladder and death of the patient (Fig. 877). In a case of distended bladder the history shows first difficulty in passing urine and later constant dribbling of urine due to the overdistention. There may be symptoms of uremia. When the patient is catheterized the supposed tumor disappears, but it may require a very long catheter to reach the urine because of the distortion and lengthening of the urethra.

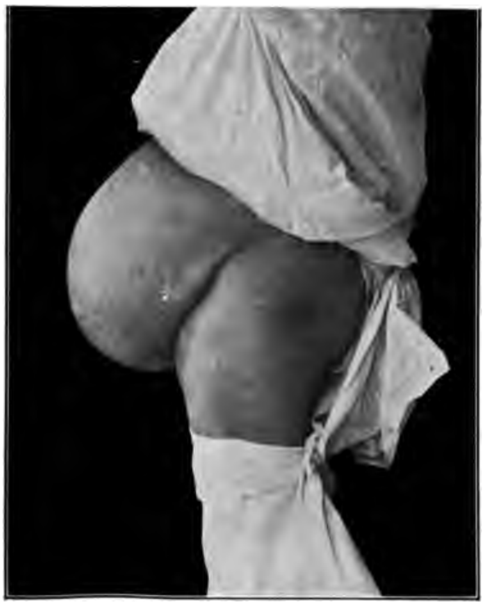


Fig. 876.—Obesity, mistaken for ovarian tumor. This patient was sent to a hospital for operation for a supposed ovarian cyst. (Hirst—*Diseases of Women.*)

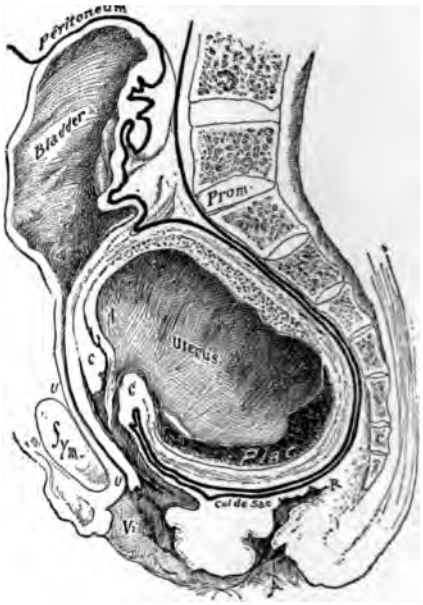


Fig. 877.—In the differential diagnosis of abdominal enlargements the possibility of a distended bladder must not be lost sight of. Frozen section of the body of a woman who died from rupture of a distended bladder. The cause of the retention of urine was a retroverted uterus four months pregnant. (Norris—American Textbook of Obstetrics, from *Arch. of Gynec.*)

g. **Tumor of Some Abdominal Organ** presents the fixed or least movable portion at some organ in the abdomen, the rounded free border extending toward the pelvis or into the pelvis. The mass may be displaced upward into the abdominal cavity and then the pelvis is clear. There are symptoms associated with the organ involved, and no particular symptoms of disturbance of the pelvic organs.

h. **Tuberculous Peritonitis.**—There is fluid in the abdominal cavity, either free or encysted, associated with evidences of tuberculous inflammation in the pelvis or in the abdominal cavity or in both. There are frequently evident signs of tuberculosis elsewhere, usually in the lungs or in the intestines. The tuberculin reactions may aid materially in determining whether the intra-abdominal trouble is tuberculous.

COMPLICATIONS

Having determined that an ovarian cyst is present, we must then consider certain complications that may be present or that may appear later. These complications are as follows:

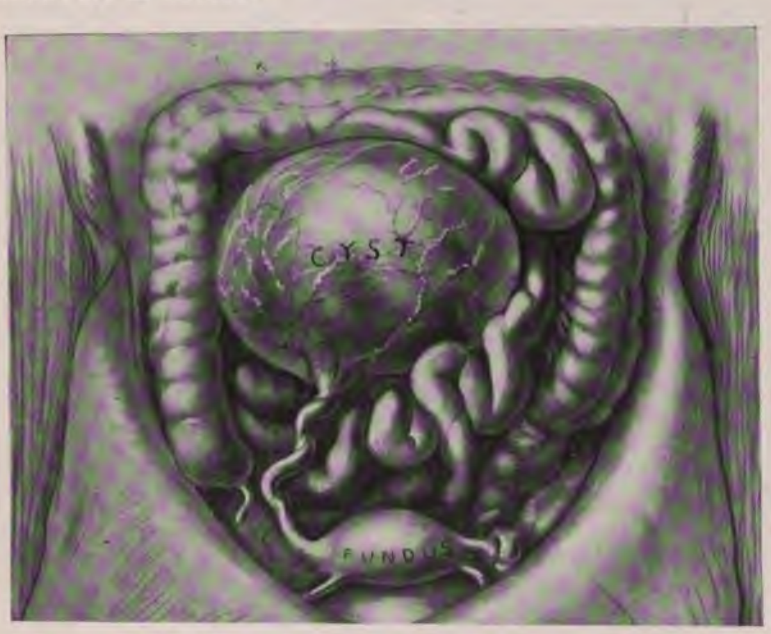


Fig. 878.—Ovarian cyst with a long slender pedicle. (Montgomery—*Practical Gynecology.*)

1. Local peritonitis, forming adhesions.
2. Hemorrhage into the cyst.
3. Rotation of the cyst, producing torsion of the pedicle.
4. Inflammation and suppuration of the cyst.
5. Rupture of the cyst.
6. Ascites accompanying the tumor.
7. Intestinal obstruction.
8. Pregnancy accompanying the cyst.

1. **Local Peritonitis** is accompanied by some pain and tenderness over a part of the tumor. There may be some fever, but usually this symptom is not marked; the process consists simply of irritation at some portion of the

outer surface of the cyst and the formation there of plastic exudate, binding the cyst to some adjacent organ or to the abdominal wall. In a few days the pains disappear, but the exudate remains, becomes organized and forms an adhesion, which may interfere more or less with the subsequent operation.

2. **Hemorrhage into the Cyst** is what gives the various colors to the cyst contents. This hemorrhage usually takes place slowly in small quantities and without clinical symptoms. Occasionally, however, a copious hemorrhage takes place, usually from some interference with the venous return, such as twisting of the pedicle or pressure of an enlarged uterus, or it may follow tapping of the cyst. The hemorrhage may be so severe as to cause collapse of the patient.

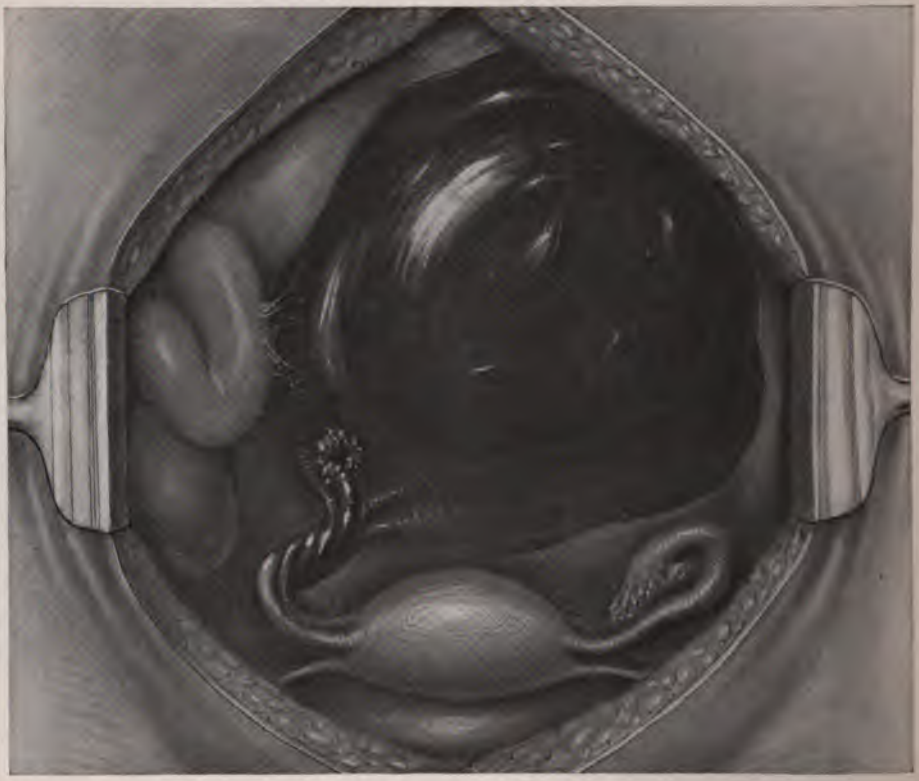


Fig. 879.—Indicating an ovarian cyst with twisted pedicle. The turning of the tumor twists the pedicle, blocking the circulation and causing thrombosis in the pedicle and throughout the tumor. The extravasation of blood causes the affected tissues to become black.

3. **Rotation of the Cyst** may take place where the pedicle is long (Figs. 878, 879). The amount of rotation varies from a half turn to several complete turns. Torsion of the pedicle is supposed to be favored by an injury, such as a fall or blow, and by active exercise, and also by the alternate filling and emptying of the bladder and the bowel, and during pregnancy by the enlargement of the uterus.

The effect of torsion of the pedicle on the circulation of the tumor depends, of course, on the amount of rotation. The veins are the first to suffer flow of blood in them is impeded, causing the tumor to become engorged, and there is hemorrhage into the interior of the cyst, either in the form of extravasation or the rupture of a vein with severe hemorrhage. If the twisting increases, there is thrombosis of the vessels and extravasation of bloody fluid into the peritoneal cavity, and later necrosis of the tumor, followed by fatal peritonitis. The hemorrhage into the tumor causes it to appear black (Fig. 879). The symptoms of torsion of the pedicle are very marked. When a patient with an ovarian tumor complains of sudden pain in the abdomen and has vomiting, and there is a sudden increase in the size of the tumor, it is probable that torsion of the pedicle has taken place. In some cases there are repeated attacks of slight torsion.

4. **Inflammation and Suppuration of the Cyst** is, of course, due to infection. The infection may come from the intestinal canal or from the bladder or from a fallopian tube or from tapping the cyst. The most common source of infection is the fallopian tube. The patient contracts salpingitis, adhesions form between the inflamed tube and the cyst wall, and infection spreads along these adhesions and invades the cyst. Adhesions with some portions of the intestinal tract, especially with the appendix, may likewise lead to infection of the cyst. Tapping, which was formerly common, often led to infection of the cyst. Dermoid cysts are especially prone to suppuration. Infections of cysts are not uncommonly seen in the course of the acute infectious fevers, especially typhoid.

The symptoms of suppuration of the cyst are pain, fever, tenderness over the tumor, rapid pulse and exhaustion and emaciation. If the suppurating cyst does not speedily cause death by peritonitis, it may later rupture into the intestine or bladder or vagina. The teeth, hair and pieces of bone discharged in rare cases from the urethra or rectum are usually due to suppuration of a dermoid cyst.

5. **Rupture of the Cyst** may be sudden, as from a fall or blow or other injury, or it may be the result of a gradual thinning of the cyst wall. The result of rupture of the cyst depends on the quantity and quality of the cyst contents. In unilocular cysts with nonirritating fluid rupture may produce no severe symptoms. There is some weakness and abdominal pain and marked diuresis, the patient sometimes passing several gallons of urine in twenty-four hours. The abdomen, which was before prominent from the tumor, becomes flattened and lax. The physical signs change from those of encysted fluid to those of free fluid (pages 197 and 201). The cyst may not refill, and if no inflammation takes place, the patient recovers. But this favorable termination takes place only in rare cases. In the great majority of cases of cysts, rupture causes peritonitis, which may be very severe and rapidly fatal.

Rupture of a cyst is indicated by the sudden disappearance of the tumor or marked diminution in its size, accompanied by evidences of free fluid in the peritoneal cavity and collapse of the patient, and later peritonitis and death.

6. **Ascites.**—A small amount of ascitic fluid may be present with many

cysts, but a large quantity is rare so long as the tumor retains its normal condition. Consequently the presence of considerable ascitic fluid with an ovarian cyst becomes of diagnostic importance. The ascites may of course, be due to some heart trouble or kidney trouble or liver trouble, or may be due to peritoneal tuberculosis. Aside from such complications, ascitic fluid is indicative of some serious complications; e.g., a papillary cyst, especially after malignant change, or rupture of an ordinary cyst.

7. **Intestinal Obstruction.**—This may be caused by direct pressure of the tumor or by adhesions which contract and narrow the intestine. It is of course a very serious complication and is indicated by the ordinary symptoms of intestinal obstruction appearing in the presence of an ovarian tumor.

8. **Pregnancy** may accompany an ovarian cyst adding much to the difficulties of diagnosis (Fig. 880).

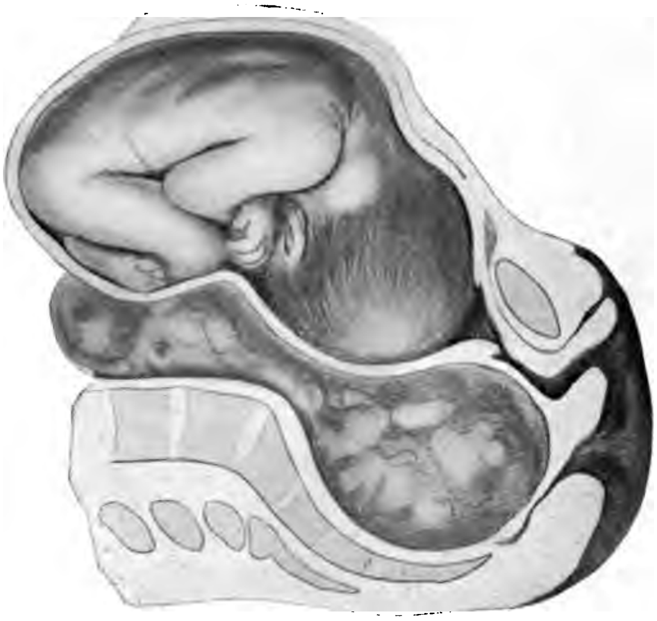


Fig. 880.—Pelvis and lower abdomen filled with a mass composed of a pregnant uterus and an ovarian cyst. (Williams, after Bumm—*Obstetrics*.)

TREATMENT

of Ovarian Cysts

The treatment of the **simple cysts** of the ovary is symptomatic. There is no method of affecting these little cysts directly except by operation, and the symptoms are usually not severe enough to warrant operation. Consequently, the treatment is directed toward relieving the symptoms, and consists of the measures recommended under chronic pelvic inflammation for relieving the same symptoms. If the symptoms are persistent and very troublesome in spite of all minor measures, the abdomen may be opened and the cysts removed, saving as much as possible of both the ovaries.

The treatment of the **proliferating cysts** and **dermoid cysts** is removal by operation as soon as found, if the condition of the patient will permit.

Ovarian tumors are not at all influenced by palliative measures, they do not stop growing spontaneously and they tend to death within a few years. Consequently they should be removed as soon as found or as soon as the patient can be put in condition for the operation. Sometimes the patient is in such a weakened condition that she must be given a course of treatment before operation. Some general disease, such as kidney or heart or lung trouble, may make it necessary to delay the operation until the patient can be put in better condition.

Then, again, the patient may be in such condition that a radical operation would be almost certainly fatal. In such a case it would, of course, be useless to operate. In some such inoperable cases the patient may be rendered temporarily more comfortable by tapping the cyst with a trocar and drawing off the fluid. In all cases of proliferating cysts, however, in which the patient is in suitable condition, the tumor should be removed by operation.

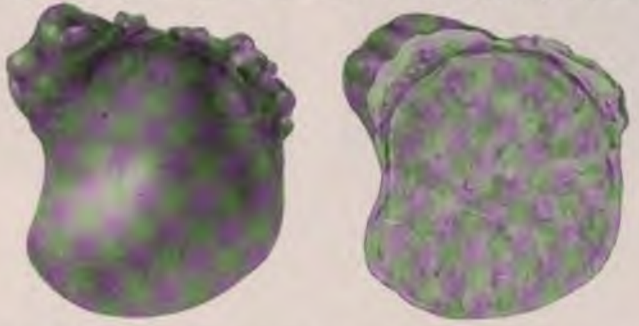


Fig. 881.—A small ovarian fibroma. Cross section, showing the typical fibromatous structure and a well-defined capsule. Gyn. Lab.

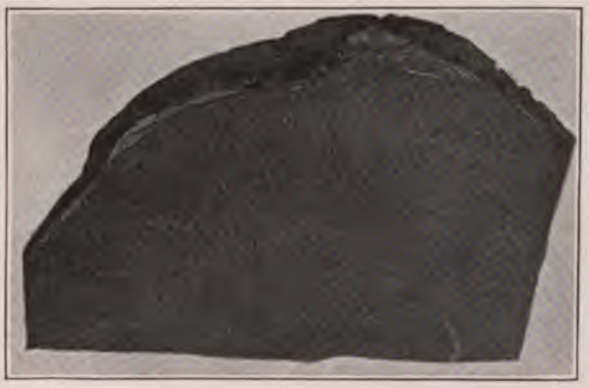
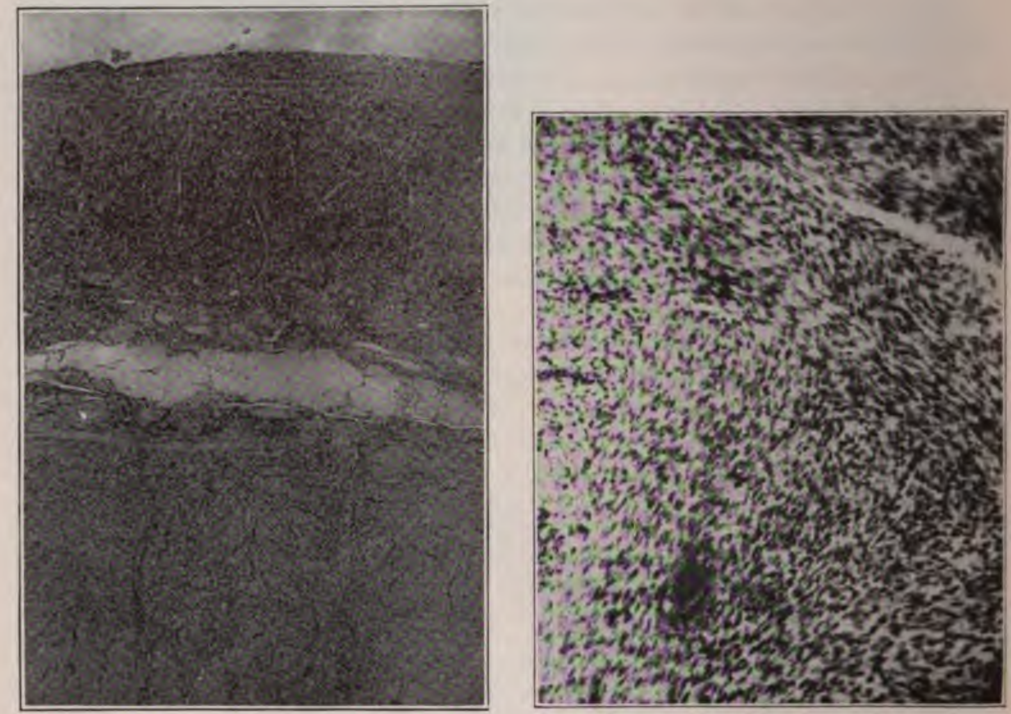


Fig. 882.—Fibroma of ovary. Photomicrograph from the specimen in Fig. 881. The narrow layer of compressed ovarian tissue is shown above, overlying the fibroma below. Gyn. Lab.

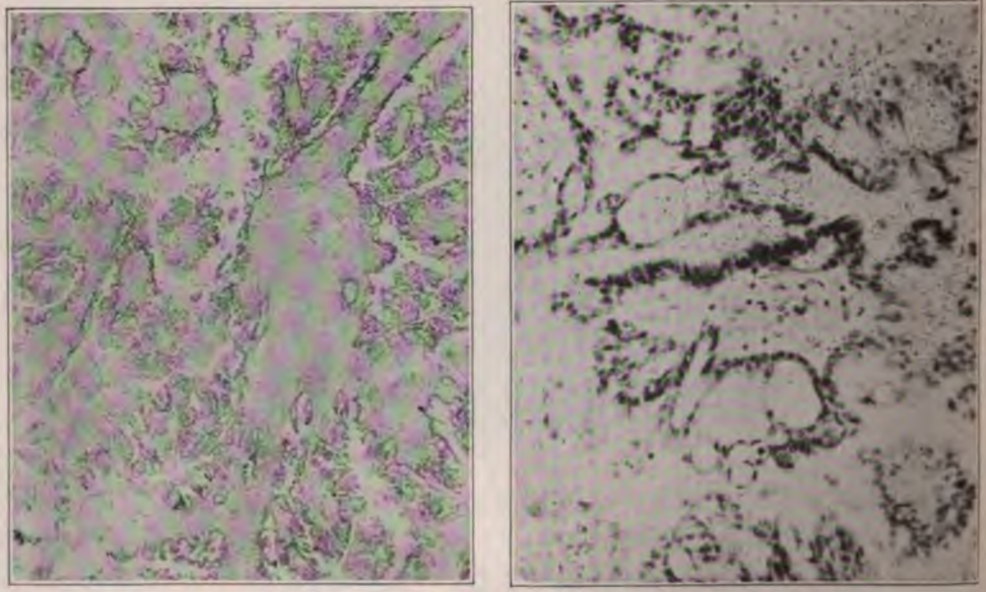
SOLID TUMORS OF THE OVARY

Solid tumors of the ovary are rare. They comprise only about 5 per cent of all ovarian growths that come to operation.



A. *B.*

Fig. 883.—Fibroma of ovary. *A.* Lower power of the upper part of Fig. 882, showing ovarian tissue above, a group of corpora albicantia at the line of demarcation and below this the structure of the fibromyoma. *B.* High power, showing details of the tumor structure. Gyn. Lab.



A. *B.*

Fig. 884.—Carcinoma of ovary, from a papillary cyst. *A,* Low power, showing general arrangement. *B,* High power, showing cells and details. Gyn. Lab.

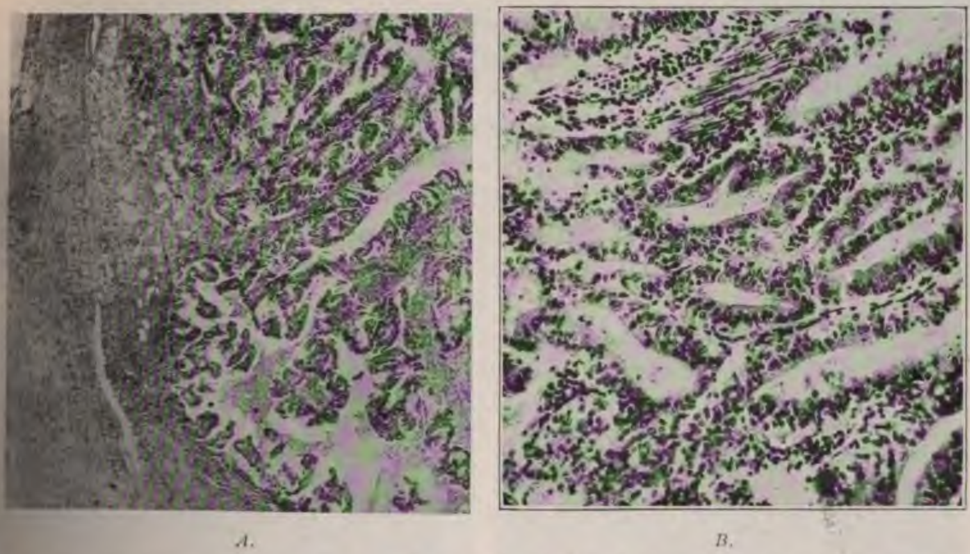


Fig. 885.—Carcinoma of ovary, primary solid tumor. *A.* Section showing the gland-like formation of the cell masses. *B.* High power, showing details of cells and arrangement. Gyn. Lab.

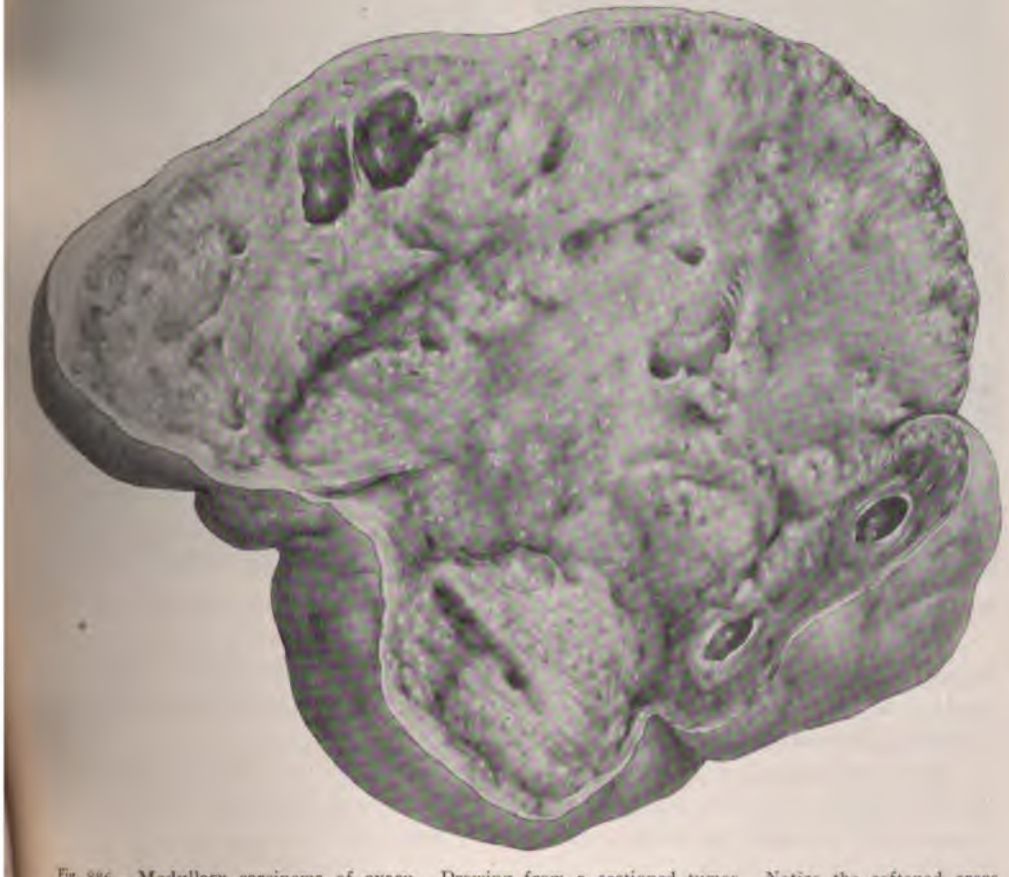


Fig. 886.—Medullary carcinoma of ovary. Drawing from a sectioned tumor. Notice the softened areas in the otherwise solid growth. Gyn. Lab.

The **simple tumors** are fibromata and myomata (Figs. 881 to 883). These growths are infrequent and usually small, though occasionally one will grow to weigh ten or fifteen pounds.

Of the **malignant growths** both carcinoma and sarcoma occur in the ovary, though neither is very frequent.

Carcinoma of the ovary is generally secondary to the papillary cyst (Fig. 884). Erdmann and Spaulding (Surg., Gynec. and Obst., October, 1921) give excellent illustrations of this change (Fig. 847). The erratic tissue-proliferation in a dermoid cyst may take a malignant turn. Spalding (Am. Jour. Obst. and Gynec., 1919, lxxx, No. 4) reports such a case (Figs. 856 to 858).

Solid primary carcinomata of the ovary are rare (Fig. 885). Usually they represent the medullary type. They are of a soft consistency as the result of degenerative processes, which are clearly shown on the cross section of such a growth in Fig. 886. The microscopic structure is shown in Fig. 887.

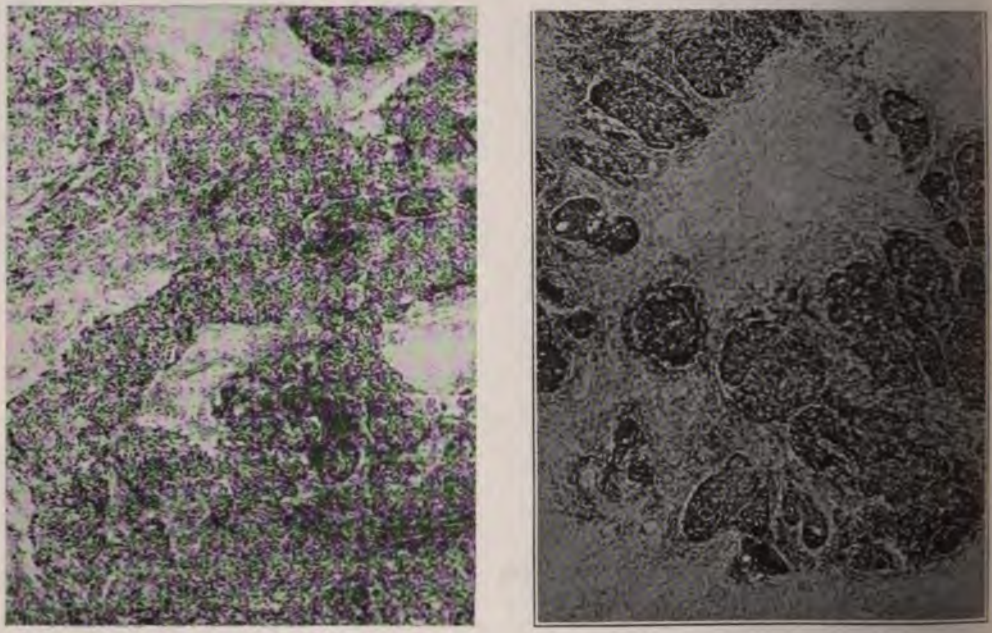

A. *B.*

Fig. 887.—Medullary carcinoma of ovary. *A.* Low power, from the tumor in Fig. 886, showing general structure. *B.* High power, showing carcinoma cell nests. Gyn. Lab.

A very large percentage of ovarian carcinomata, however, are metastatic in origin. They develop secondarily to carcinoma of other organs, either of uterus and tubes, or of organs lying distantly in the peritoneal cavity, such as stomach, intestines, gall bladder, pancreas, etc.

It is probable that these secondary carcinomatous growths are started in the ovaries by particles which have become detached from the primary carcinoma and through peristalsis and gravity have been carried to the ovaries deep down in the pelvis.

It is this fact which most plausibly explains the common bilaterality of the solid ovarian cancers, a point of great practical importance and well justifying the demand of certain authors always to remove both ovaries even if only one macroscopically seems affected by a malignant growth.

For this same reason it becomes imperative in all cases of diagnosed or suspected bilateral ovarian carcinoma to search most carefully for a possible primary carcinoma in the gastrointestinal tract or in another organ within the abdominal cavity. It is obvious that in these cases operative efforts of necessity must prove futile.

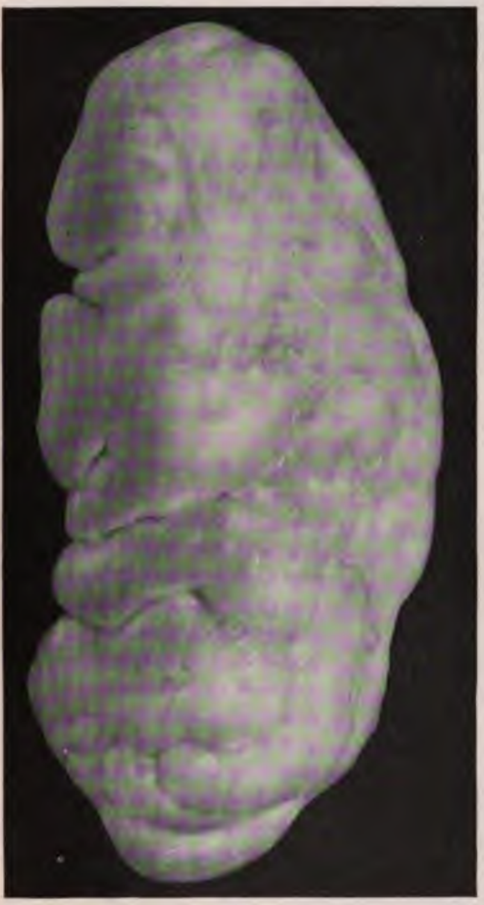


Fig. 888.—Krukenberg tumor of ovary. Gyn. Lab.

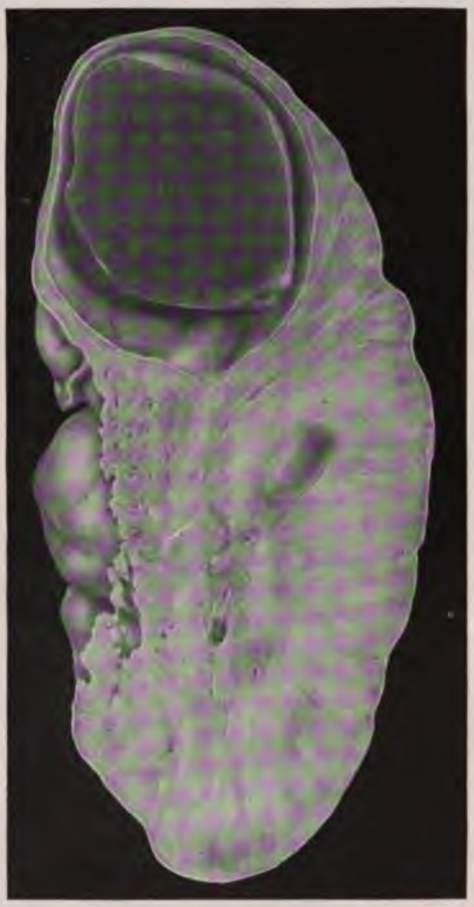


Fig. 889.—Same specimen shown in section. Gyn. Lab.

Figs. 888 to 892 illustrate a special and rather rare type of such a secondary, metastatic ovarian carcinoma, known in literature as a Krukenberg tumor. This particular growth, a carcinoma suggesting, however, structurally in certain features a sarcoma, is characterized by peculiar cells with an eccentrically placed nucleus. These "signet ring" or "sickle" cells are well shown in Fig. 892.

Sarcoma of the ovary may be of the spindle-celled or round-celled variety

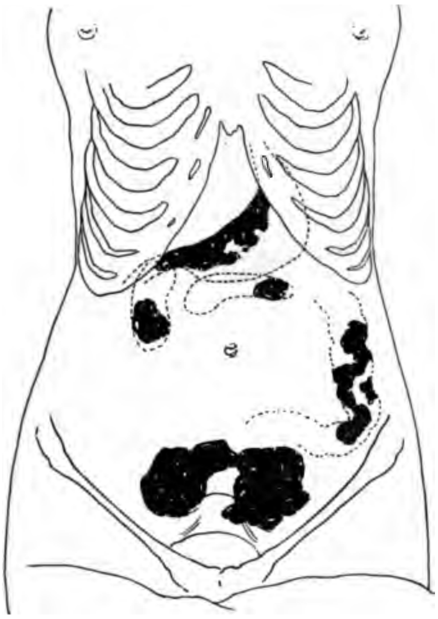


Fig. 890.—Krukenberg tumor, indicating the primary growth (in the stomach) and the distribution of the secondary growths in this case (both ovaries, right kidney, pancreas, and sigmoid flexure of the colon).

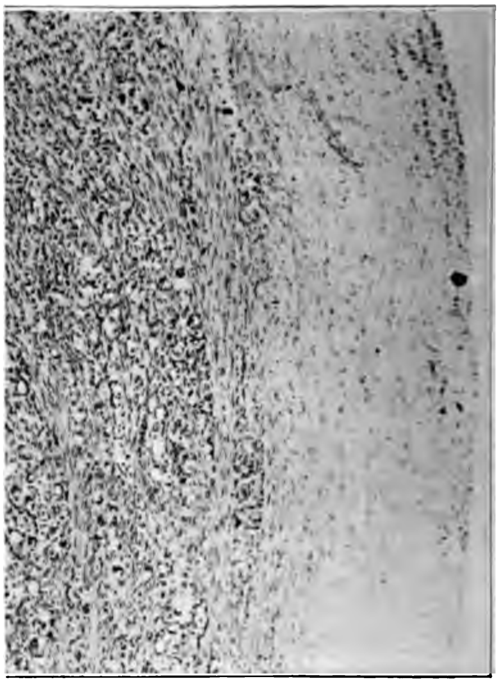


Fig. 891. Krukenberg tumor of ovary. Microscopic section from specimen shown in **Fig. 889**, low power. Gyn. Lab.

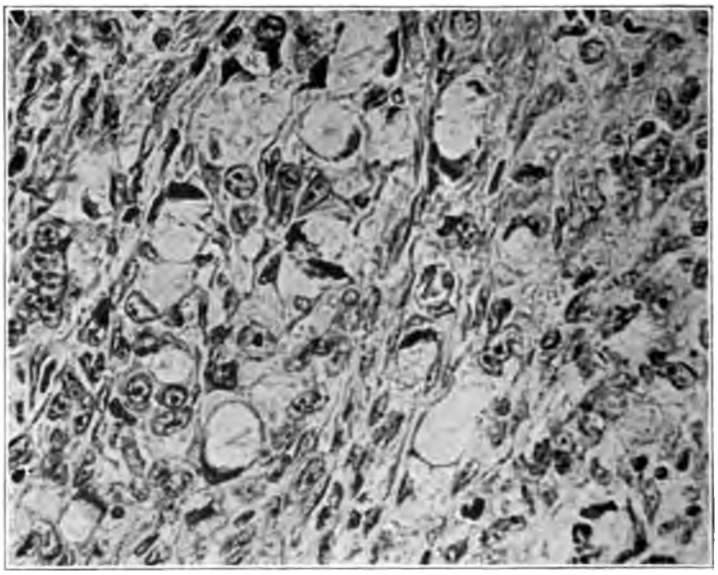


Fig. 892.—Krukenberg tumor of ovary. High power of specimen shown in Fig. 891. The characteristic "sickle" or "signet ring" cells are well shown. Gyn. Lab.

and may be primary or secondary. It usually grows rapidly and as a rule both ovaries are affected. The microscopic structure is shown in Figs. 893 and 894.

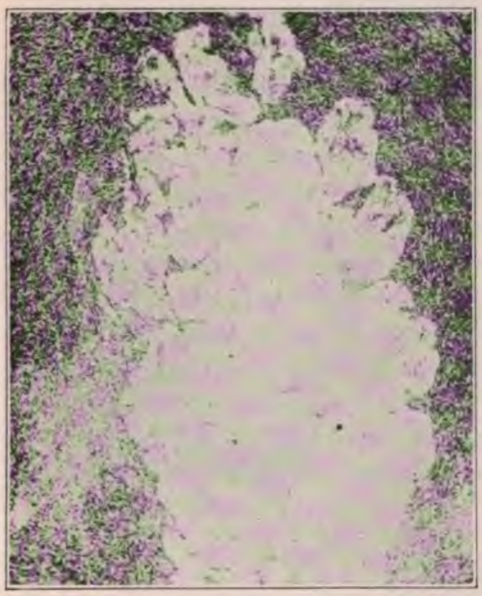


Fig. 893.—Sarcoma of the ovary, secondary to a sarcoma originating in a uterine myoma. Photomicrograph, low power. Gyn. Lab.

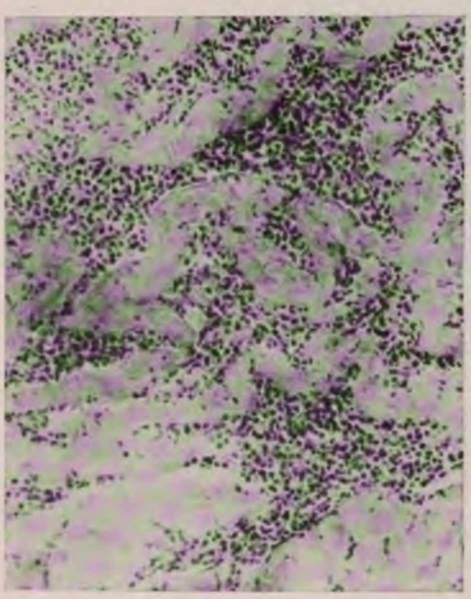


Fig. 894.—Another section from same growth shown in Fig. 893. The sarcomatous infiltration has involved a corpus albicans. Gyn. Lab.

Diagnosis and Treatment

Owing to the rarity of solid tumors of the ovary and the absence of distinctive symptoms, the diagnosis is usually made only after the abdomen is open. In the case of a firm mass presenting the symptoms and signs already described for a small ovarian tumor (except fluctuation) a probable diagnosis of solid tumor of the ovary may be made.

The treatment for every solid tumor of the ovary is prompt removal by operation. Prompt removal is important because of the frequency of malignant development. If the growth is already inoperable, then deep x-ray treatment is advisable and may give considerable relief.

TUMORS OF THE PAROVARIUM

The tumors of the parovarium (broad ligament tumors) are almost invariably cysts and they are of two kinds, simple cysts and papillary cysts.

The **simple cysts** are single cysts containing clear fluid resembling water. On account of their confined position they produce very troublesome symptoms while still small. They arise from various parts of the remains of the wolffian body (parovarium, paroophoron—Figs. 826, 827).

The **proliferating papillary cysts** arise also from the remnants of the wolffian body and their characteristic is the development of papillary growths in the interior of the cyst, which fill the cyst and grow through its wall, and spread to the peritoneal surface and the adjacent organs (uterus, ovaries, intestines). The whole pelvis may be filled with these warty cauliflower growths and, having spread to all the adjacent structures, they often give rise to an erroneous diagnosis of cancer.

In the majority of cases they are bilateral and usually rupture before attaining a large size. Though they grow rapidly and spread to adjacent organs, where they implant themselves on the peritoneal surfaces and grow freely, they do not have the fatal infiltrating and destructive tendency of malignant disease, and many patients recover when the abdomen is opened and the larger part of the growth removed. Later they may undergo malignant change, and then they present the usual characteristics of carcinomata.

These proliferating papillary cysts arise from the parovarium. As most parovarian tubules lie in the broad ligament, the papillary cysts are usually broad ligament cysts. But they may also arise from that part of the parovarium which is prolonged into the hilum of the ovary. It is from that location that the papillary cysts of the ovary arise. As mentioned before, the papillary cysts of the ovary are usually bilateral and present all the characteristics of the broad ligament papillary cysts, except that they arise from the ovary instead of from the broad ligament. They are supposed to arise from the remnants of wolffian tubules lying in the medullary portion of the ovary.

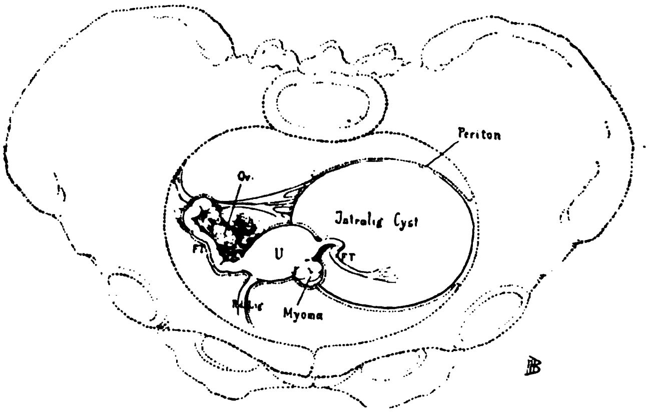


Fig. 895.—A parovarian cyst (broad ligament cyst) of the left side. Notice how it separates the layers of the broad ligament and also displaces the uterus. (Kelly—*Operative Gynecology*.)

Symptoms and Diagnosis

In the clinical history and in the signs obtained by examination, broad ligament tumors resemble ovarian tumors very closely. Practically the same symptoms and signs which serve to distinguish an ovarian tumor from other diseases serve, also, to distinguish a broad ligament tumor from the same diseases. So that as a rule, in this condition, when there is trouble in diagnosis, the difficulty is to tell whether the tumor present is a broad ligament tumor or an ovarian tumor.

The characteristics of the ordinary parovarian cyst, or "broad ligament cysts," as they are usually called, are as follows:

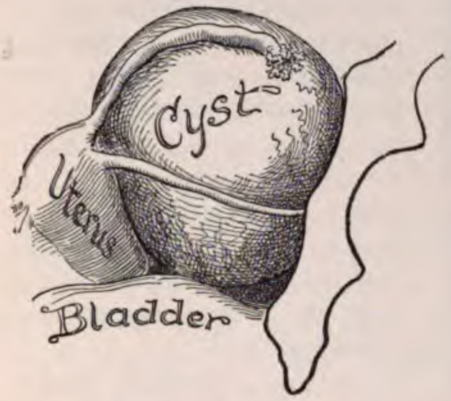


Fig. 896.—A parovarian cyst, forming a large mass and displacing the uterus. (Ashton—*Practice of Gynecology.*)

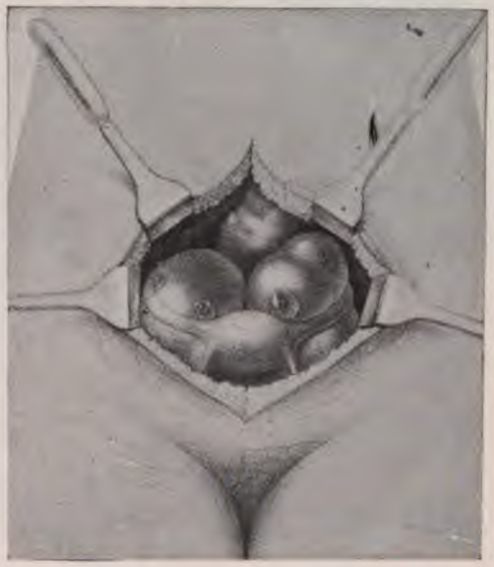


Fig. 897.—Graafian-follicle cysts of the ovaries, which have become intraligamentary. (Kelly—*Operative Gynecology.*)

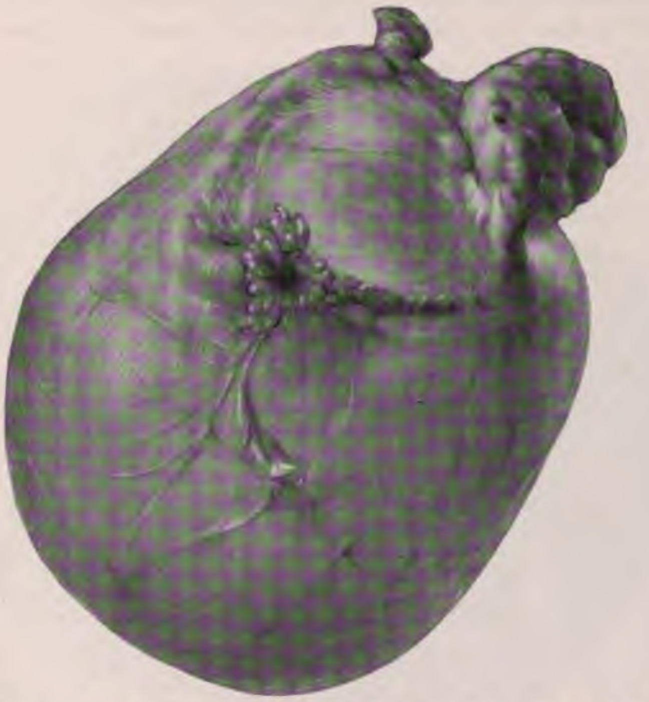


Fig. 898.—Parovarian cyst. The ovary is seen at the upper right portion. Just above it to the left is the severed uterine end of the tube, from which the flattened tube may be traced under the peritoneum to its fimbriated end near the center of the drawing. As the cyst grew in its situation between the layers of the broad ligament the sides of the ligament were spread apart, the ovary was raised and the tube was stretched out and flattened. Gyn. Lab.

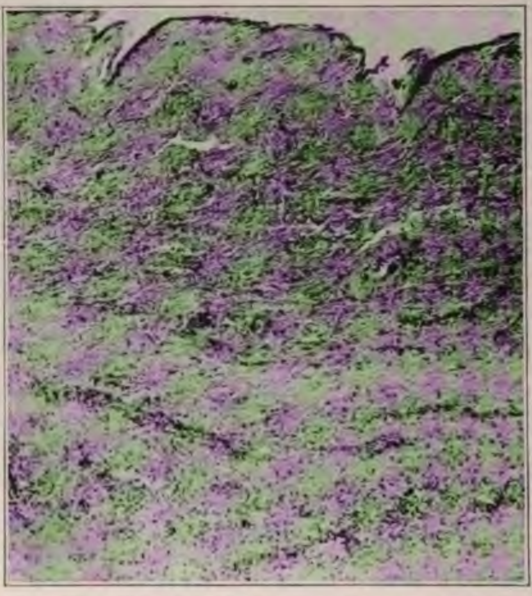


Fig. 899.—The wall of a simple parovarian cyst. Its inner surface is lined by a single layer of flattened epithelium. There are no secondary cavities. Gyn. Lab.

1. They grow into the broad ligament, separating its layers and displacing the adjacent organs. The uterus is pushed far to one side, and the tube is usually stretched over the cyst, being much lengthened and flattened (Figs. 895 to 900). The ovary also is flattened out on the surface of the cyst. There is more or less fixation of the cyst and also of the displaced uterus. They may grow under the peritoneum and separate it from the rectum, bladder and abdominal wall.

2. They produce serious symptoms much earlier than ovarian cysts. This is due to their being confined within the broad ligament and the pelvis, and hence making serious pressure on surrounding organs while they are still small. For this reason they cause more pelvic

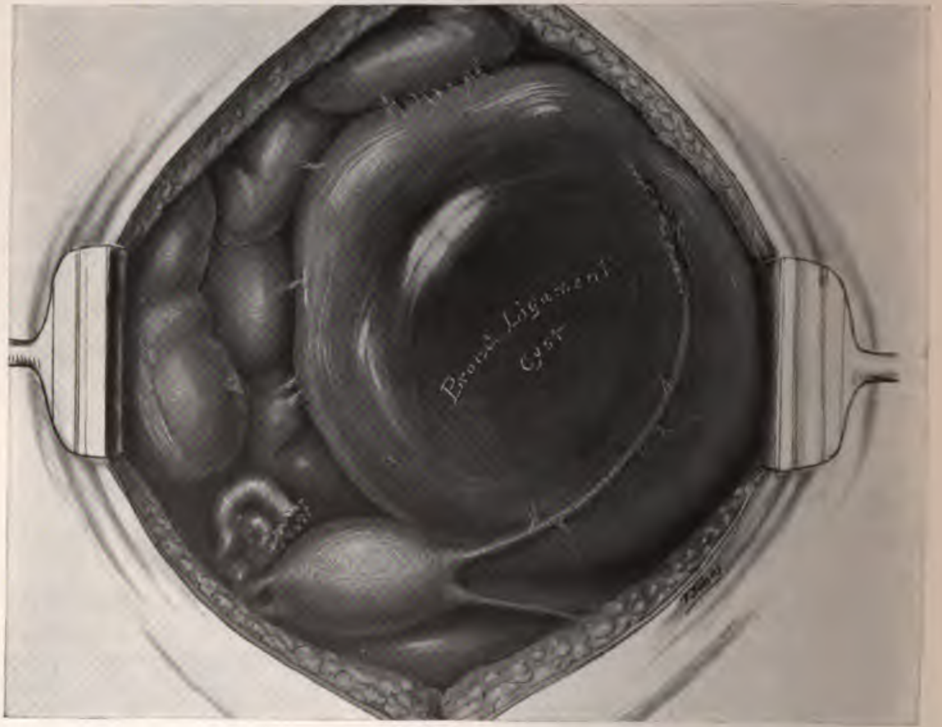


Fig. 900.—Large broad ligament cyst, showing the stretching of the fallopian tube and the displacement of the uterus.

pain and more menstrual disturbance than ovarian cysts of the same size.

The papillary cyst, after rupture and spread of its papillary growths, may produce a clinical picture very much resembling tuberculous peritonitis or chronic pelvic inflammation. It then usually gives rise to marked ascites, and the fluid returns repeatedly after tapping.

The **rapidity of growth** of the broad ligament tumors depends somewhat on the character of the growth. Those of slow growth are usually simple cysts. The papillary cysts grow rapidly at the last, though the growth may be slow while confined within the broad ligament.

Treatment

The treatment for broad ligament tumors is the same as for ovarian tumors—that is, removal by abdominal section. In some cases of simple cyst, very low in the pelvis, with the patient in bad condition, it is better to open the cyst from below, drain away the fluid and pack the cavity, keeping the wound open until the cavity is obliterated, the same as in the treatment of pelvic abscess. Some cases may be permanently cured in this way with much less danger than by abdominal section.

Ordinarily, however, the preferable operation is abdominal section. The operation for a parovarian cyst is somewhat more difficult than for an ovarian cyst owing to the fact that the parovarian growth lies between the layers of the broad ligament. This necessitates opening the broad ligament to extract the cyst and also necessitates careful closure of the remaining broad ligament cavity to prevent oozing or secondary hemorrhage.

CHAPTER XIII

MALFORMATIONS

Malformations are caused by errors in development. The growth of an organ may be simply arrested or it may grow in the wrong way. In either case there results a malformation. Most genital deformities are due to partial arrest of development. To understand these malformations, it is necessary to understand something about the development of the organs.

POINTS IN DEVELOPMENT

The first structures indicative of the genitourinary organs are the **wolffian ducts,** which appear in the embryo about the fifteenth day, and the **wolffian bodies,** which appear the eighteenth day. These structures represent the future kidneys and genital apparatus. They lie on either side of the median line.

During the fourth week another duct appears near the wolffian body of each side. These are the **muellerian ducts.** The wolffian ducts go to form the excretory ducts of the genital apparatus in the male. The muellerian ducts go to form the excretory ducts of the genital apparatus in the female. A part of the wolffian body of each side finally forms the genital gland of that side, i.e., the ovary in the female and the testicle in the male.

At the end of the first month the middle part of each wolffian body shows thickening and proliferation, resulting in the formation of elevated bands called "genital ridges." These are the earliest traces of the genital glands. For a few days they remain indifferent. Very soon, however, a difference in the two sexes is noticed. The primitive female gland "possesses a large number of the primitive sexual cells and evidences a tendency of its elements to arrange themselves into groups, in which the large primitive ova become central figures." The primitive male gland, on the other hand, shows a tendency to the formation of a network of cell cords—the forerunners of the seminiferous tubules. "Microscopic examination of the sexual primitive glands even at the end of the fifth week is capable of distinguishing the future sex of the being." In a short time there is a difference in the gross appearance of the gland, with a difference in the arrangement of the ducts.

The parts played by the wolffian ducts and muellerian ducts differ in the two sexes. In the **female** the muellerian ducts are the most important. The lower portions of the ducts of Mueller become fused and form the vagina and uterus, and the upper portions remain separated and form the fallopian tubes (Figs. 901, 902, 903). The lower end of the canal (future vagina) formed by the fused muellerian tubes is closed at first. Later the lower part of the septum, which shuts off this canal from the urogenital sinus, breaks down, permitting the canal (vagina) to communicate with the urogenital sinus. If this septum fails to break down, imperforate hymen results (Fig. 905). The very end of the other extremity of the muellerian duct is usually represented by a miniature cyst attached to one of the fimbria and called the "hydatid of Morgagni" (Fig. 827).

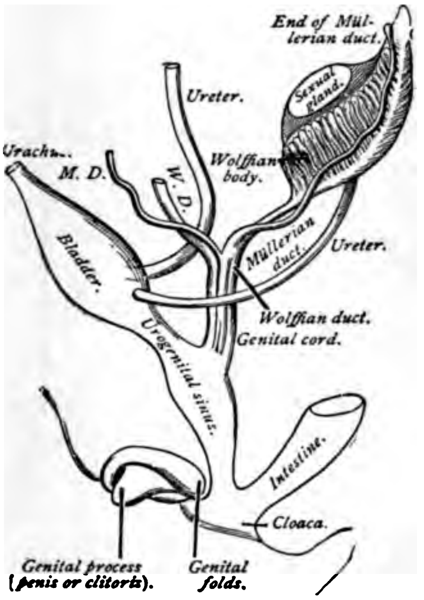


Fig. 901.—Diagram representing the indifferent stage in the development of the generative organs. (Piersol, after Thompson—*American Textbook of Obstetrics.*)

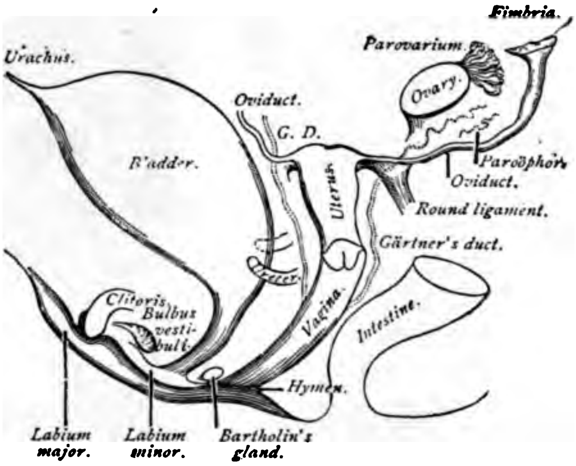


Fig. 902.—Diagram illustrating the changes that take place in the development of the female generative organs. (Piersol, after Thompson—*American Textbook of Obstetrics.*)

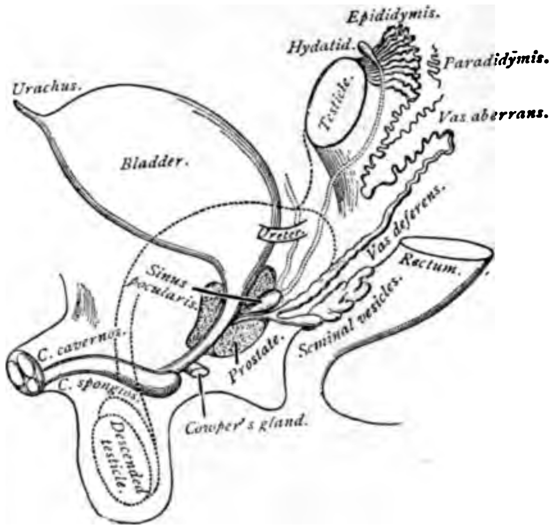


Fig. 903.—Diagram illustrating the changes that take place in the development of the male generative organs. (Piersol, after Thompson—*American Textbook of Obstetrics.*)

The wolffian body forms the ovary and also contributes the transverse tubules of the parovarium. The upper part of the wolffian duct remains as the "head tube" of the parovarium (Fig. 827). The lower part of the wolffian duct sometimes remains in whole or in part, and is then known as "Gartner's duct" (Fig. 827). These parovarium tubules are all atrophic structures of but little importance. The ovary is the important organ formed from the wolffian body in the female.

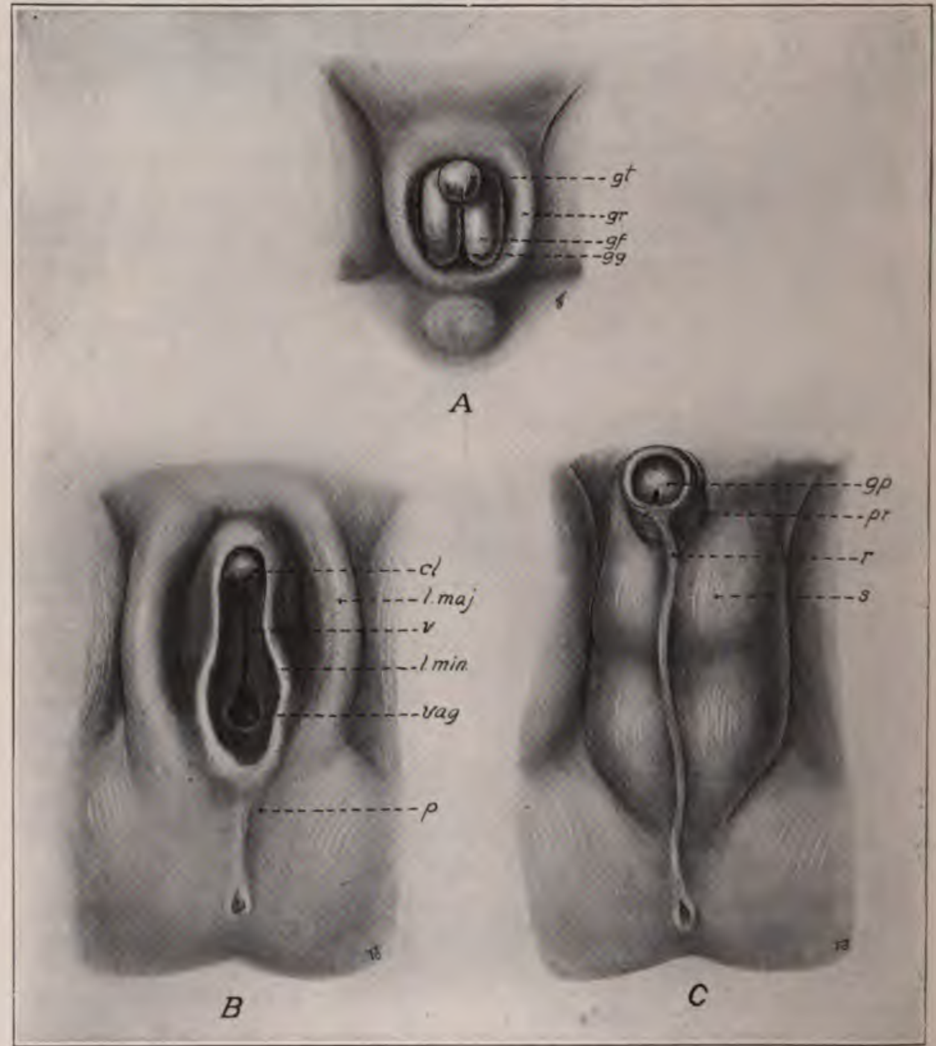


Fig. 904.—Development of the external genitals (after Ecker-Ziegler models). *A*, indifferent stage (eighth week); *gt*, genital tubercle; *gr*, genital ridge; *gf*, genital fold; *gg*, genital groove. *B*, female type; *cl*, clitoris; *l. maj.*, labia majora; *v*, vestibule; *l. min.*, labia minora; *vag.*, vagina; *p.*, perineum. *C*, male type; *gp.*, glans penis; *pr.*, prepuce; *r*, raphe; *s.*, scrotum.

In the **male** the wolffian tubules and wolffian duct contribute the important system of excretory tubes represented by the vas deferens and the epididymis, while the muellerian duct is atrophic, its ends alone remaining. Its outer end forms the "hydatid of Morgagni," closely connected with the epididymis, and its inner end forms the "sinus pocularis," or "uterus masculinus," opening into the prostatic portion of the urethra (Figs. 901, 903).

External Genitals (Fig. 904). "Until the ninth or tenth weeks the external genitals afford no positive information as to sex"—they are indifferent. They then begin to differentiate and "usually by the end of the third month the external sexual organs are characteristic beyond doubt." Up to the sixth week the external openings of the intestine and of the urinary apparatus are received within a common cloacal recess whose rectourogenital orifice is surmounted by a small conical elevation, the "genital tubercle." The lower and posterior surface of the genital tubercle is divided by a furrow—the "genital groove"—bounded by thickened edges called the "genital folds." Gradually a septum develops, separating the rectal opening from the genitourinary opening. The "genital tubercle" forms the **clitoris** and the "genital folds" form the **labia.**

The **vestibule** is formed by the cloaco or common opening of the intestinal tract and urinary tract in the early embryo. The **perineum,** developing, separates the rectum from this common vestibule. And the septum (hymen) closing the end of the rudimentary vagina (fused muellerian ducts) breaks, allowing the vagina to open into the vestibule. This opening through the septum varies much in size, shape and situation, giving the various forms of opening found in the hymen. It is usually small, and roughly crescentic in shape.

The **vagina** is formed by the fusion of the lower portions of the two muellerian ducts and the absorption of the longitudinal septum between the cavities. The **uterus** is formed by the fusion of the middle portions of the two muellerian ducts and the absorption of the septum between the cavities. The **fallopian** tube of each side is formed by the upper portion of the muellerian duct of that side. The **ovary** of each side is formed from a portion of the wolffian body of that side. The **parovarium** consists of the "transverse tubules," which are formed from the wolffian body, and the "head tube," which is formed from the wolffian duct. The **paroophoron,** lying in the broad ligament near the parovarium, is the atrophic remains of the lower segment of the wolffian body.

ANOMALIES OF DEVELOPMENT

The more common anomalies of development are as follows:

1. A septum is found between the vaginal cavity and the urogenital sinus, constituting imperforate hymen (Figs. 905, 906).

2. More rarely, perfect canalization does not take place in the fused muellerian cords (each of which develops a central canal and becomes a muellerian duct), resulting in a closed place at some point in the canal, giving **atresia of vagina** or atresia of cervix (Fig. 911). In very rare cases all of the lower part of the fused cords fails of canalization, causing **absence of vagina** (Fig. 907).

3. The septum which normally separates the urinary tract (urethra) from the vagina may be defective, forming the anomaly known as **hypospadias.**

4. The septum between the two fused muellerian ducts may persist all the way to the hymen, in which case there exists **double vagina** (Figs. 908, 909).

5. The septum may persist into the uterine portion of the muellerian tract, forming a **uterus septus** (Fig. 910).

6. The middle portions of the muellerian ducts may fail to fuse, giving a **double uterus** (uterus didelphys) (Fig. 910).

7. They may fuse only imperfectly, giving a uterus with **rudimentary horns.** There may be either two well-marked horns (uterus bicornis) (Fig. 910), or a fairly well-developed uterus with one rudimentary horn (Figs. 910, 912, 914).

8. The wolffian duct may persist to some extent, giving a duct lying alongside the vagina called **Gartner's duct** (Figs. 826, 827). This may extend all the way along the vagina and open near the hymen, or there may be only remnants of the tube here and there. These remnants sometimes develop so as to form small vaginal cysts. Such cysts are situated in the vaginal wall along the course of the atrophic wolffian duct.

The above are the principal gross developmental anomalies ordinarily met with. There are many other rarer anomalies, of which lack of space prevents mention. These vary in each organ all the way from slight modification to complete absence. The **ovary** is probably the least frequently affected by anomalies, and yet, as rare as they are, they have produced many surprises in abdominal work, especially in the cases of pregnancy following the supposed complete removal of both ovaries. This means, of course, that some ovarian tissue remains, and it is usually said to be a "third ovary." While the development of three normal ovaries is not impossible, the condition present in the cases under consideration is, as a rule, "lobulation" of the ovary of one or both sides, and not the presence of a complete third ovary. The lobulated ovary may show only a marked constriction, or it may be divided into two or three or many separate lobules, with considerable space between various lobules. Bovée mentions a case of his in which the ovary of each side was represented simply by numerous small particles of ovarian tissue scattered over a large area of the posterior surface of the broad ligament, and resembling verrucal excrescences. It is evident that in such a case some outlying nodules of various tissue would almost certainly be missed, especially if obscured by an inflammatory exudate.

The malformations most commonly requiring treatment are:

Imperforate Hymen.
Atresia of Vagina.
Double Vagina.
Malformations of Uterus.
Pseudohermaphroditism.

IMPERFORATE HYMEN

If the time-honored supposition that the hymen is simply the remains of the septum between the embryonic vagina and the sinus urogenitalis is true, then imperforate hymen means the failure of this septum to break down. If, on the other hand, the hymen represents another structure formed by active circular proliferation just back of the septum area, than imperforate hymen or occluded hymen is the result of excessive proliferation and coalescence, instead of failure to break down. Taussig has investigated this subject embryologically and in two articles (Jour. Anat., 1908, and Am. Jour. Obst. and Gynec., November, 1921) presents substantial points in favor of the proliferation theory.

Imperforate or occluded hymen causes no disturbance until puberty. After puberty there is a collection of menstrual blood back of the imperforate hymen (Fig. 906). This gradually increases in amount and distends the vagina. If the obstruction is not relieved, there is gradual dilation of the uterus and even of the fallopian tubes, forming a cystic mass, the contents of which are blood and the walls of which are formed by the vagina and uterus.

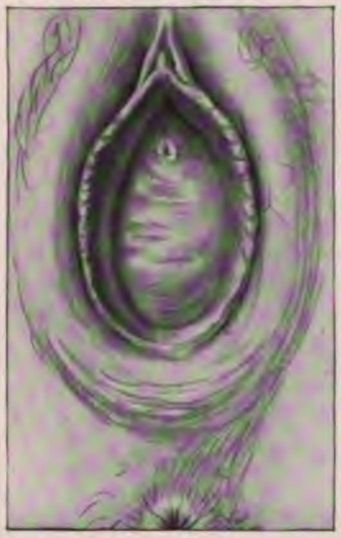


Fig. 905.—Imperforate hymen. There is no vaginal opening, the urethra being the only opening present in the vestibule. (Montgomery—*Practical Gynecology.*)

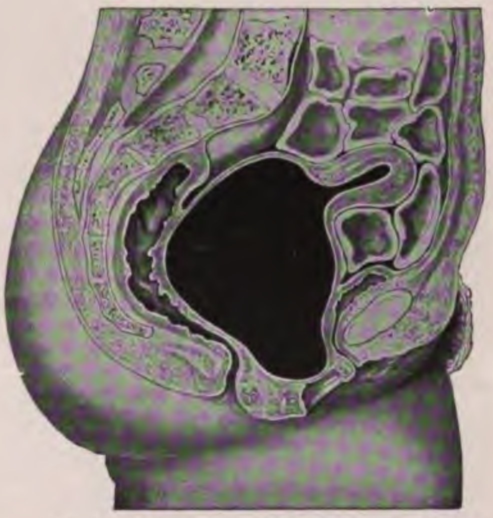


Fig. 906.—Hematocolpos, which may result from imperforate hymen or from atresia at the lower portion of the vagina. The menstrual blood has not yet distended the uterus. (Montgomery—*Practical Gynecology.*)

The **symptoms** are characteristic. At the age of puberty no menstruation appears, but about every four weeks the patient has a spell of feeling ill, with pain in the lower abdomen and the usual disturbances accompanying menstruation. The mother supposes that the girl is going to menstruate, but there is no flow. This is repeated month after month. As the collection of blood increases, the pain and disturbance become more marked, the patient's health begins to suffer, and a tender mass appears in the lower abdomen. Finally the patient becomes so sick that the physician makes a local examination. He finds that there is no vaginal opening (Fig. 905), but instead there is a fluctuating mass occupying the position of the vagina and uterus (Fig. 906).

The **treatment** is crucial incision of the distended hymen, and, if the membrane is thick, excision of the most of it. The cavity above should be washed out with normal saline solution and then packed with sterile gauze. Great care is necessary to prevent infection. The decomposing blood that necessarily remains along the walls of the cavity favors the rapid growth of pus germs, and, though the operation is a simple one, patients have died from it, or rather from the infection following.

ATRESIA OF VAGINA

The method of origin of this malformation has been explained. The condition may vary all the way from a thin septum blocking the canal to complete absence of the canal. The external genitals may be abnormal (Fig. 907). On making the vaginal **examination,** an obstruction is met with at some point in the vagina. If there is a collection of menstrual blood back of the septum, fluctuation may be detected. Digital examination per rectum will give some idea of the extent of the atresia and the amount of blood behind it. If the patient is well past the age of puberty, and there is no fluid above the atresia, the probability is that the uterus is anomalous, so much so that menstruation could not come on even though the obstruction in the vagina were removed. So, before undertaking an operation for making a vaginal canal, rectoabdominal examination, under anesthesia if necessary, should be made to establish the size, shape and probable development of the uterus. In cases of apparent absence of the uterus, rectovesical examination may be of assistance in locating a small nodule in the situation of the uterus.

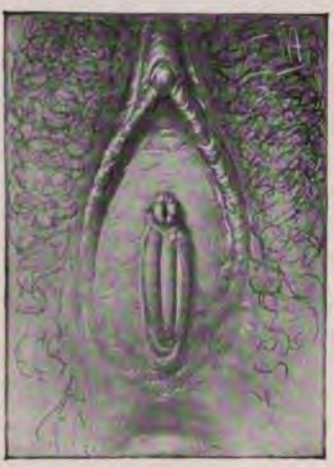


Fig. 907.—The appearance of the external genitals in a case of absence of the vagina. (Kelly—*Operative Gynecology.*)

The **treatment** depends on the circumstances of the case. If only a thin septum is present it should be treated practically the same as an imperforate hymen—i.e., incised, to let out the blood, and then partially or wholly excised. If a considerable proportion or the whole of the vaginal canal is missing, the treatment requires extended operative measures according to the special conditions present. It may be necessary to build up nearly a whole new vagina. The details of this operative work are considered in the author's Operative Gynecology.

Acquired Atresia.—A considerable proportion of the cases of marked stenosis of the vagina, amounting almost to atresia, are acquired. Such a condition may result from injuries in childhood or inflammation, particularly the gonorrheal vaginitis of childhood, and severe inflammations following the exanthemata. Congenital syphilis also may cause the same, following severe ulceration. In later life, scar-tissue resulting from injuries in labor is the most frequent cause of narrowings in the canal and bands, and constrictions and distortions. Other causes in the adult are syphilitic ulceration, injuries and severe destructive inflammations. A pessary left in the vagina for several years may lead to such a result. In rare cases even complete atresia may result from some one of these causes. The atrophic vaginitis or "adhesive vaginitis" of old age (senile vaginitis) leads to adhesion of the walls of the vagina and stenosis and partial obliteration of the canal (see Fig. 260). The treatment for acquired stenosis or atresia of the vagina is practically the same as for the congenital. The acquired form, however, is, when extensive, likely to be more difficult of satisfactory treatment on account of the large amount of scar-tissue in the vicinity.

DOUBLE VAGINA

This consists usually simply in a longitudinal septum dividing the vagina into two canals (septate vagina). The vagina with entirely separate walls is a much rarer condition. The longitudinal septum is the persisting fused wall of the two muellerian ducts, as already pointed out. It may extend the whole length of the vagina, giving two openings at the vestibule, and half the cervix in each upper end (Figs. 908, 909). On the other hand, it may consist simply in a septum extending part way. Even when the septum extends the full length of the vagina, one canal is usually so much smaller than the other and placed so far to one side that it does not interfere

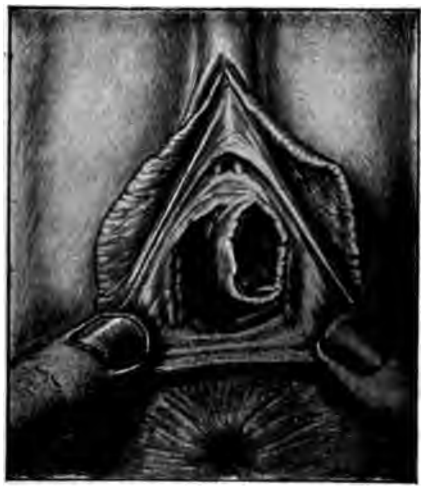


Fig. 908.—The appearance of the external genitals in a case of double vagina. (Kelly—*Operative Gynecology.*)

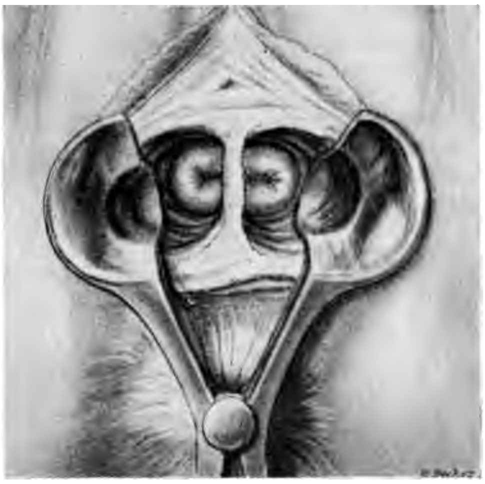


Fig. 909.—Same case as Fig. 908, with speculum introduced, exposing the two vaginal canals and the half cervix at the top of each. (Kelly—*Operative Gynecology.*)

with coitus or pregnancy. In fact the opening of one canal may be so flattened out at the side of an apparently normal vaginal opening that it is not noticeable except on very close inspection. In such a case, however, when the slit beside the vaginal opening is noticed, further examination may reveal a rudimentary canal of considerable size, sometimes almost as large as the patulous one. At the upper part of each vagina is one-half of the cervix. When labor takes place in a case of double vaginal canal, the septum is likely to be torn, partially or completely, converting the two canals into one. Portions of the septum may remain as a partial septum at the upper part of the vagina or as irregular bands and tags. The writer recalls one case of septate vagina and uterus seen in the first pregnancy. The patient passed through labor without particular incident, except that the cervix (half cervix) was very slow in dilating. The lower part of the vaginal septum near the vaginal entrance was torn, but the greater part remained and seemed to occasion no trouble. Later, the patient returned to the hospital with gonorrhea affecting the vaginal and uterine cavity of each side. Still later, the writer was obliged to curet both uterine cavities.

The treatment of double vagina is simple. If the septum is causing any obstruction or disturbance, it is divided or, better still, largely excised, so that the two vaginal canals are converted into one.

MALFORMATIONS OF THE UTERUS

Double Uterus.—The malformation may consist simply of a partial or complete septum in an otherwise normal uterus (uterus septate) (Figs. 910, 912, 913), or a rudimentary horn with a nearly normal uterus (Fig. 914), or a uterus with a body divided into two horns (uterus bicornis, Fig. 910), or a double uterus, with the body and cervix of one side separate from the body and cervix of the other side (uterus didelphys, Fig. 910), or a "unicorn uterus"—i.e., uterus made up of muellerian duct of one side only, the other being absent or nearly so (Fig. 910). The most severe grades of deformity are very rare, though they are to be thought of in the diagnosis in puzzling cases. A septum in an otherwise normal uterus is discovered only by intrauterine manipulation, such as curetment or the introduction of the hand after labor for the removal of adherent placenta or for other reasons.

No treatment for double uterus is required ordinarily, with the exception of the precaution, when curetting the uterus, to be certain that both cavities are clear. It is appreciated, of course, that in this connection, and also in double uterus, pregnancy may take place in each of the two cavities, and at different times, producing various surprising results.

Rudimentary Horn.—The uterine malformation of most practical interest is that of a rudimentary horn with an otherwise nearly normal uterus. This is not so very infrequent and many are the diagnostic difficulties that result therefrom. Such a rudimentary horn extends outward from the main body of the uterus, and receives at its outer extremity the attachment of the fallopian tube and round ligament of that side. The point of attachment of the round ligament is, in some cases, the only decisive gross evidence as to whether the mass in question is an enlarged fallopian tube or a rudimentary horn of the uterus. The cavity of the rudimentary horn may be complete, extending all the way from the fallopian tube to the main cavity of the uterus, or it may be only partial, being absent at some part (Fig. 914), or the cavity may be entirely absent, the horn existing merely as a musculofibrous cord connecting the fallopian tube and round ligament with the uterus. Most of the trouble resulting from a rudimentary horn comes from infection in it or pregnancy in it (Fig. 914).

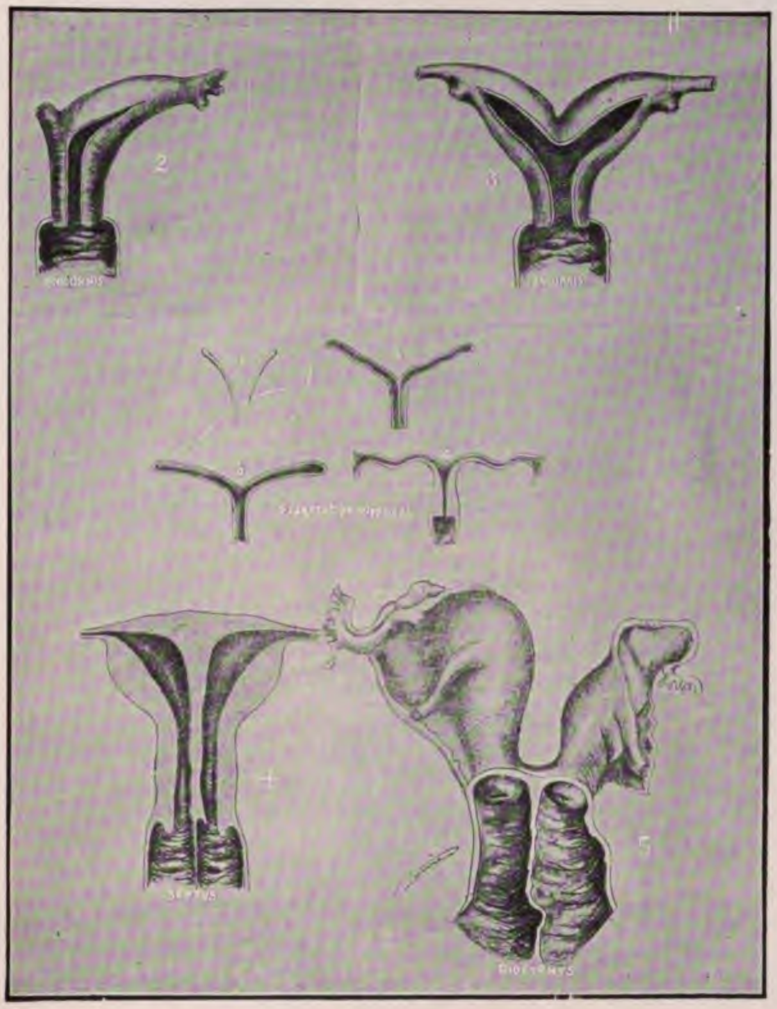


Fig. 910.—Diagrammatic representation of the development and malformations of the uterus. *1.* Showing the different stages in the union of the muellerian ducts to form the uterus and vagina and fallopian tubes. *2.* Uterus unicornis. *3.* Uterus bicornis. *4.* Uterus septus. *5.* Uterus duplex. (Gilliam—*Practical Gynecology.*)

The **symptoms** and **differential diagnosis** and **treatment** are the same as for similar affections of the fallopian tube, with the following special points:

1. The mass is usually connected to the uterus by a much broader attachment.

2. There is more enlargement of the uterus and distortion of its cavity.

3. The mass may become much larger without rupture (if pregnant) or without adhesions (if inflammatory).

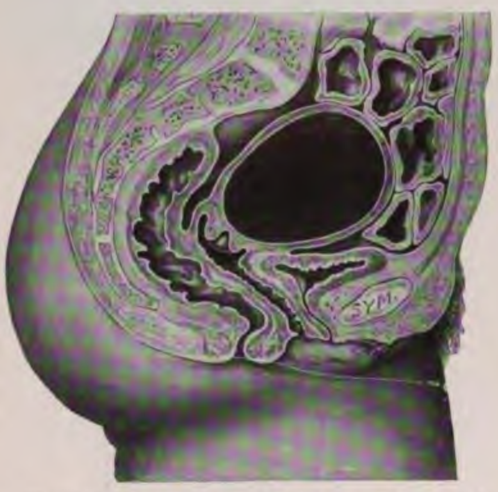


Fig. 911.—Uterus distended with menstrual blood (hematometra), due to atresia of the cervix. (Montgomery—*Practical Gynecology.*)

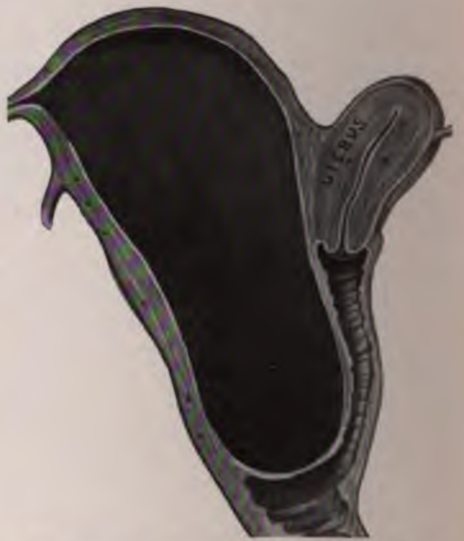


Fig. 912.—Hematometra in a rudimentary horn of the uterus. (Montgomery—*Practical Gynecology.*)

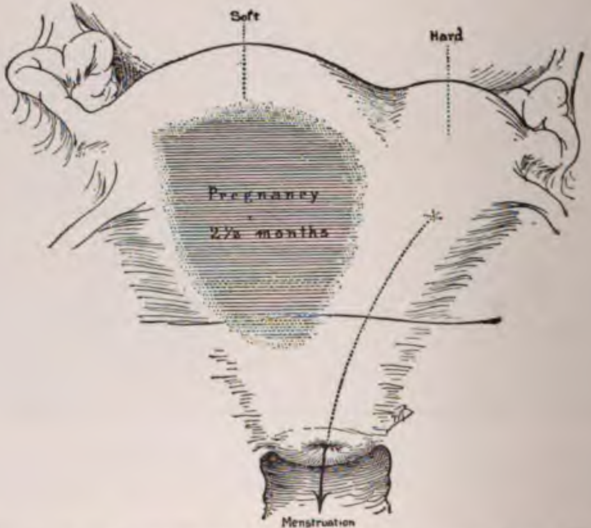


Fig. 913.—Pregnancy in the right half of a septate uterus. (Kelly—*Operative Gynecology.*)

4. There may be a communication with the main uterine cavity. In most cases the condition is not thought of until found during the course of an operation for what was supposed to be some one of the more common affections. Even when thought of, a diagnosis is rarely possible (except in an examination under anesthesia), for it produces the symptoms and signs of more common conditions, and the trouble is naturally supposed to be some one of these more common affections. In some cases, however, there are anomalous symptoms or signs that make diagnosis difficult and doubtful, and arouse suspicion of this malformation. Sometimes there is decided resemblance to a fibroid. The author recalls one such case. The symptoms and signs were anomalous and puzzling. He made a diagnosis of probable fibroid with complications. Operation revealed a rudimentary uterine horn, with the remains of an early pregnancy in it. There was no fibroid.

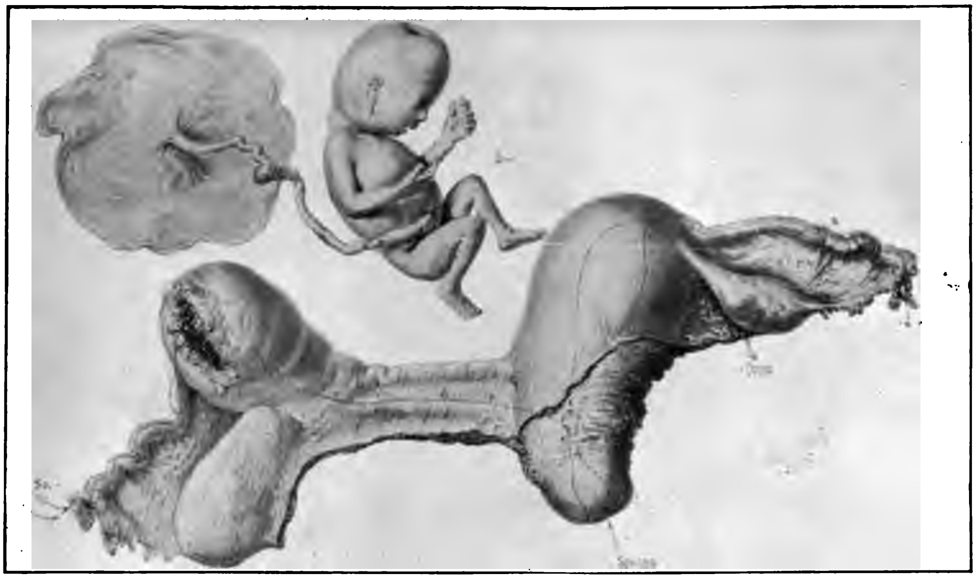
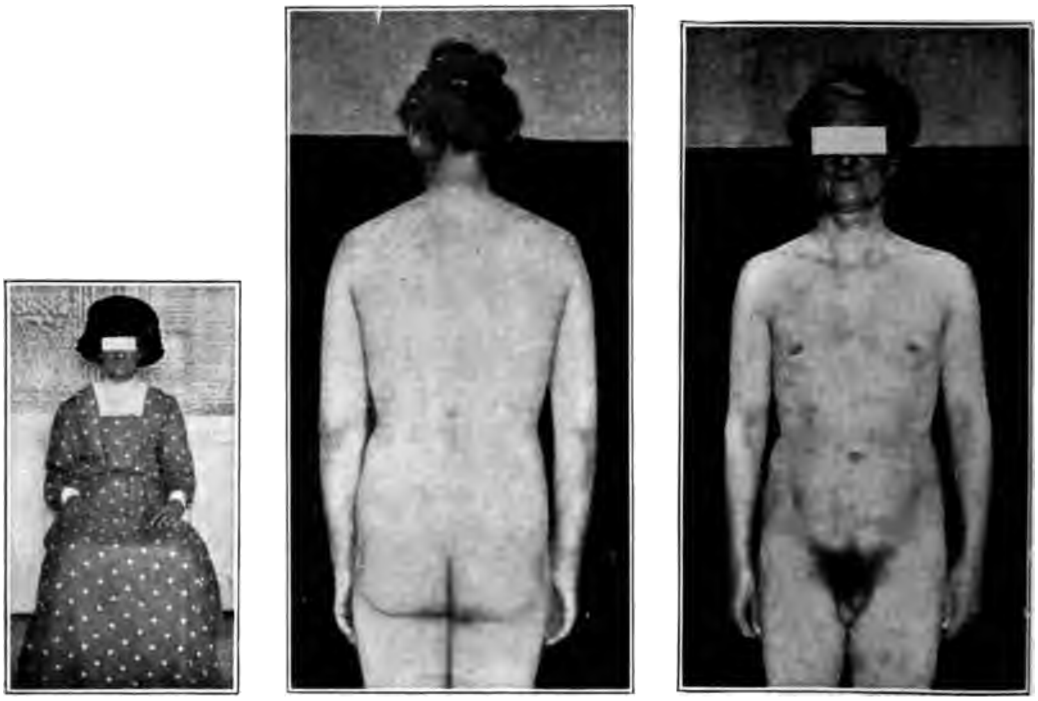


Fig. 914.—Pregnancy in a rudimentary horn of the uterus. As there is no communicating cavity between the uterine cavity and site of the pregnancy in the rudimentary horn, the spermatozoa evidently came by way of the opposite tube, as indicated by the small arrows. (Kelly—*Operative Gynecology.*)

PSEUDOHERMAPHRODITISM

A true **hermaphrodite** is, according to Ahlfeld's definition, "an individual with functionating active glands of both sexes, provided with excretory ducts." No such case has been reported in which the diagnosis has been fully accepted, though there is considerable dispute among authorities concerning some. Several cases have been recorded in which, among other anomalies, there were glands that on microscopic examination presented some of the characteristics of both ovary and testicle. But that condition does not constitute a double set of glands and excretory ducts.

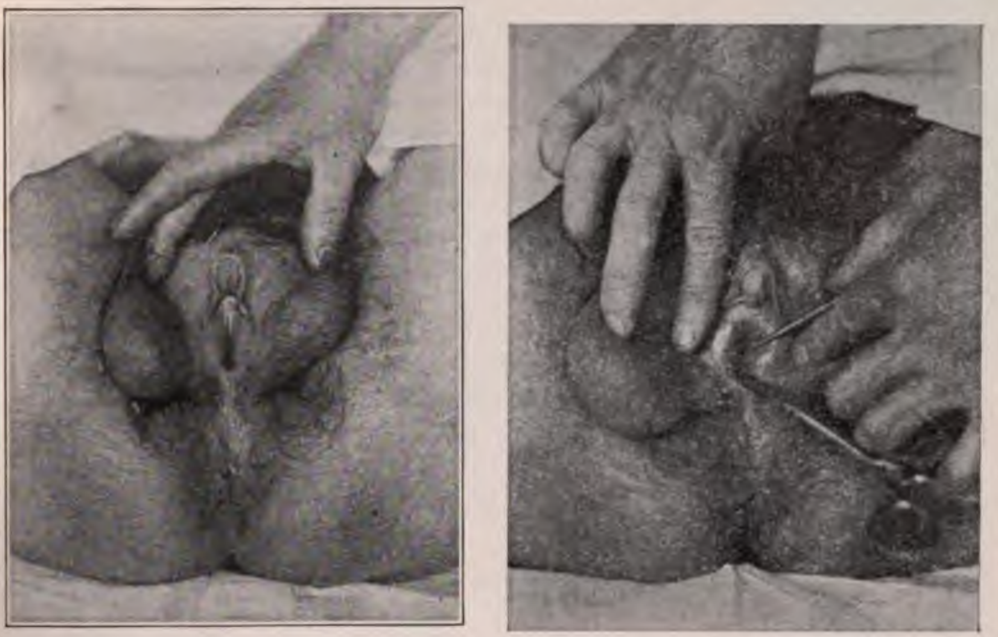
A **pseudohermaphrodite** is an individual of one sex presenting some of the local characteristics of the other sex. Many such cases have been recorded and not a few of them have presented a most difficult problem in regard to the diagnosis of the sex. The individual himself (or herself, as the case may be) does not seem to be able to help much in determining the real sex in the most difficult cases. Neugebauer was able to collect 942 cases of pseudohermaphroditism. In at least 41 of the pseudohermaphrodites the true sex was positively determined only after abdominal section, though in only four cases was the operation undertaken specifically for diagnostic purposes. Numerous cases are recorded where the individual dressed and lived for many years as a man or as a woman, and then ascertained that the real sex was the opposite one. The most celebrated case, perhaps, is that of Carl Hohmann, a masculine pseudohermaphrodite, who from infancy to the age of forty-six years was considered a female and lived as such. The true sex being then ascertained he assumed male attire and married as a man. The space available is not sufficient to permit the subject of pseudohermaphroditism to be taken up in an extended way. It is sufficient to mention some of the more practical points.



A. *B*. *C*.

Fig. 915.—A pseudohermaphrodite. *A*, as the patient appeared on coming to the author's office for examination. *B*, back view, showing the male type of body. Notice the broad shoulders and narrow pelvis. *C*, front view, showing the male type of breasts. Notice that the upper limit of the pubic hair is horizontal, as in the female. Otherwise the external genitals present the typical appearance of hypospadias in the male. The divided scrotum and contained testicles hang down almost as in the normal male, though the rudimentary penis is hidden.

When a child presents any anomaly of the genital organs, a most careful examination should be made and all the possibilities considered, in order to determine positively the real sex. Figs. 915 and 916 show a case in which a mistake in diagnosis of sex was made in infancy, and the individual who was really a male dressed and lived as a woman for forty years. Steps in the development of the external genitals are shown in Fig. 904. Most of the



A. *B.*

Fig. 916.—External genitals of the individual in Fig. 915. *A*, showing the general appearance—the divided scrotum and contained testicles, the rudimentary penis and the urogenital vestibule. *B*, The urogenital vestibule has been spread open, a uterine sound has been introduced into the urethra and a forceps into the sinus pocularis.

The condition here is one of male hypospadias (as will be seen by referring to the explanatory drawings in Figs. 917 and 918) and yet this individual had dressed and lived as a woman for forty years.

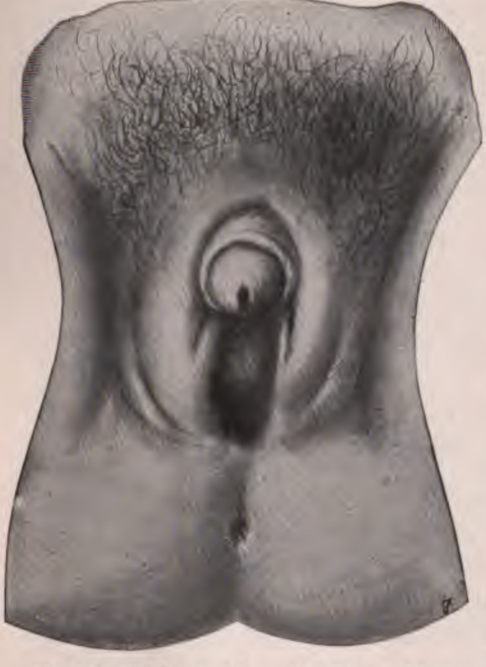


Fig. 917.—Male pseudohermaphroditism. The appearance of the external genitals in marked hypo**spadias.**

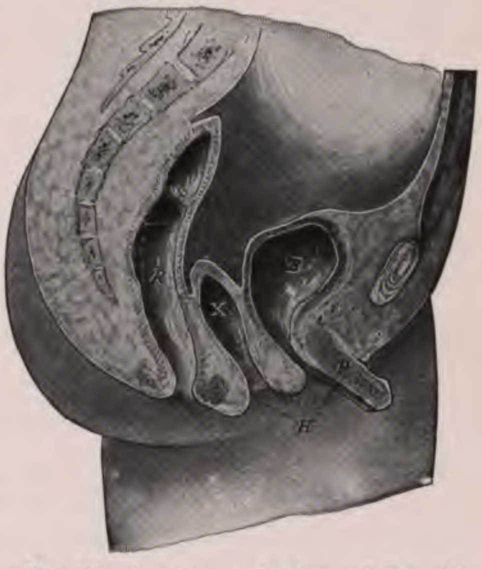


Fig. 918.—A section explanatory of Fig. 917. *B*, **bladder;** *R*, **rectum;** *P*, **penis with lower urethral wall absent;** *H*, **abnormal condition constituting hypospadias and requiring a careful examination to determine the sex of the child;** ***X*, sinus pocularis,** enlarged and opening on perineum, and likely **to be mistaken in the newborn for a vagina.**

pseudohermaphrodites are really males (have testicles in the abdomen or scrotum), the resemblance to the female external genitals being due to some form of hypospadias accompanied with an abnormal opening or pocket that is mistaken for a vagina (Figs. 917, 918). The principal anomaly in female pseudohermaphrodites, that causes some resemblance to the male sexual organs, is hypertrophy of the clitoris (Fig. 331), accompanied with adhesion of the labia minora or labia majora over the vaginal opening (Fig. 359), or with imperforate hymen (Fig. 905), or with labial hernia, or hydrocele or other labial swelling covering the vestibule.

In some cases the positive determination of the sex is very difficult and may even be impossible except by abdominal section. The general rule in cases of doubt is to class the pseudohermaphrodite as a male until unmistakable evidence of the opposite sex appears. This will avoid a mistake in a great majority of instances. In the case of four supposed female pseudohermaphrodites who were subjected to abdominal section, three of them proved to be males.

CHAPTER XIV

DISTURBANCES OF FUNCTION

Not only those disturbances which are designated as "functional" because no organic lesion is apparent, but also the disturbances of function due to various organic diseases—that is, all "disturbances of function," whether accompanied by evident organic disease or not—will be considered in this chapter. These conditions are, of course, only symptoms. They are not diseases and must not be taken to constitute a diagnosis. They are only indications of some disease, and the physician must determine the nature of that disease by further investigation.

The subjects will be taken up as follows:

Disturbances of Menstruation.
- Points in Physiology (Normal Menstruation).
- Absence of Menstruation (Amenorrhea).
- Scanty Menstruation.
- Excessive Menstruation (Menorrhagia).
- Painful Menstruation (Dysmenorrhea).
- Irregular Menstruation.
- Precocious Menstruation.
- Vicarious Menstruation.

Disturbances of Sexual Intercourse.
- Dyspareunia.
- Sexual Impotence.

Disturbances of Child-bearing.
- Sterility.

Discharge from the Genitals.
- Leucorrhea.
- Bloody Discharge.

POINTS IN PHYSIOLOGY (NORMAL MENSTRUATION)

As a prelude to the menstrual disturbances proper, it is well to call attention to some points in the physiology of normal menstruation.

Menstruation is the regular periodic discharge of blood from the uterus, recurring about every four weeks from puberty to the menopause, except during pregnancy and lactation. This definition, however, does not express all there is of menstruation. The menstrual flow is simply the outward sign of important internal changes, and we must inquire what these internal changes are and what they mean in the life of the woman.

In dealing with this subject there must be taken into consideration the following three phenomena:

Puberty and the beginning of menstruation.
Menstruation when fully established.
The menopause or "change of life."

1. **Puberty and the Beginning of Menstruation.**—Puberty is the period at which the girl matures and becomes capable of child-bearing. This period is marked by a very rapid development of the sexual organs. The ovaries, uterus, vagina and external genitals enlarge, hair appears in the pubic region and in the axillae, the breasts become more prominent, the pelvis enlarges and the whole body becomes somewhat larger and its outlines more rounded and graceful. These physical changes are accompanied by mental changes, which are indicated by modesty, sexual desire and allied phenomena.

These changes take place usually between the eleventh and sixteenth years. When the proper development has been reached, the menstrual flow appears. This flow is the sign that development has taken place and that ovulation has begun. Ovulation, no doubt, occasionally occurs before the first menstruation appears, but, as the menstrual flow is the outward sign of the internal sexual preparation, the period of sexual activity is counted as beginning with the first menstrual flow.

The age at which the first menstruation appears varies in different races and under different environment. Climate has long been thought to influence the beginning of menstruation—the colder the climate the later the first menstruation. This holds good as a general rule, the Laplander beginning to menstruate at about eighteen, while the inhabitant of hot climates at from nine to eleven. Engelmann has shown, however, that in some of the most northerly tribes menstruation appears as early as in the tropics. The mode of life has some influence, as has also the general health of the girl. Girls reared in the city begin to menstruate earlier, usually, than those reared in the country. In addition there are the personal inherited tendencies, about which we know very little, but which exercise a marked influence on the phenomena of life.

Occasionally the beginning of menstruation is long delayed without any apparent cause. Hirst had a patient who menstruated for the first time at the age of thirty-three, had four periods in the next two years, and then conceived two months later. He records also a reported case of a woman, married at thirty-four, who menstruated for the first time at the age of forty-five, and bore a child at forty-six.

In the United States a girl is expected to begin to menstruate when she is twelve or thirteen or fourteen. Not infrequently the menstrual flow begins at the age of ten or eleven, and hence when a girl reaches about the age of ten her mother should explain to her that a slight bloody flow may be expected and that it is nothing that need frighten or worry her, but entirely natural.

The period of puberty is sacred to the physical development of the girl. During these years (i.e., from the age of ten to that of sixteen) she should live in a free and healthful way—plenty of fresh air and outdoor exercise, with proper rest at menstrual periods, an abundance of plain nourishing food, regular hours of sleep, only a moderate amount of school work and other mental training—in short, a regimen that favors free physical development, unhampered by exhausting mental work or by indolent habits. Some of the distressing disturbances, pelvic and otherwise, that appear later in life are due to, or increased by, neglect at this developmental period. Girls are permitted to rise late and sit around the house, doing little else than read, when they should be at some healthful physical work (housework, outdoor exercise, etc.), or, on the other hand, they are given exhausting school studies, immoderate piano practice, and other acquisitions of modern life that keep the body too much indoors and in one posture, and that develop mental activity at the expense of physical strength.

2. **Ordinary Menstruation.**—The phenomenon is known under a variety of names—for example, "menses," "monthly sickness," "monthly period," "monthlies," "periods," "regular sickness," "catamenia." Patients usually refer to their menstruation as the time when they were "unwell."

The menstrual flow is accompanied by certain changes in endometrium already described and illustrated under uterine anatomy and physiology (Chapter VI). These consist principally of engorgement and swelling of the endometrium, hemorrhagic infiltration and the casting off of cells over small areas. Gebhard has demonstrated conclusively that there is no wholesale destruction of the endometrium, as was formerly taught. There are also some changes in the general assimilative and excretory processes of the body. The amount of urea excreted is diminished, the appetite is poor, and there is usually more or less aching and lassitude.

The menstrual discharge consists of blood mixed with secretion and epithelium from the uterus and with epithelium from the vagina. This admixture with mucus and epithelium takes place to such an extent by the time the vagina is reached that the blood does not clot. It is dark and rather viscid or stringy from its admixture with cervical mucus. The menstrual discharge has also some odor, due to slight decomposition, which takes place during its passage through the vagina. Menstrual blood taken directly from the interior of the uterus has no odor.

The amount of bloody discharge lost at each menstruation varies greatly in different individuals, the usual amount being from five to ten ounces. The rate of flow; i.e., whether or not the flow is too free—is estimated usually by the frequency with which the napkins have to be changed. The usual flow requires a change about three times daily during the height of the menstruation. If more frequent changing is necessary, the flow is too free.

There is considerable variation in the duration of the menstrual flow, the average being three to four days. Some perfectly healthy women, however, menstruate only one or two days and others six or seven days. The scanty menstruation or the profuse menstruation, as the case may be, seems to be normal for that particular individual. The duration of the flow in the same individual is usually about the same at the different periods.

The periodicity of the flow is more uniform, the flowing recurring about every 28 days. However, many healthy women menstruate at periods somewhat longer or shorter than this. In one series the duration from beginning to beginning was 28 days in 70 per cent of the cases, 30 days in 13.7 per cent, 27 days in 1.4 per cent, and 21 days in 1.6 per cent (Krieger).

Menstruation ceases during pregnancy and lactation. Exceptions to this rule are frequent. A few women menstruate for one or two periods after conception, and very often the menses return while a woman is still nursing her child.

The principal physiologic significance of menstruation is that it is a preparation of the uterus for the reception of a fertilized ovum. As to the exact significance of each step in the menstrual process, and as to whether it has to do with other important functions (eliminative), there is still much dispute. The old conception of menstruation as a general cleansing process has long since disappeared, but recently valuable arguments have been put forth to show that menstruation is the direct expression of ovarian "internal secretion." (See Chapter XV.)

The hygiene of the menstrual period is the same as the hygiene of any other period, except that there should be a little less physical and mental strain. Even when menstruation is perfectly normal, there is usually some feeling of general discomfort and a disinclination to extra physical or mental exertion, and this feeling should be favored insofar as it does not interfere with the general healthful routine of life. Exercise, tepid bathing, an abundance of sleep, regular meals and nourishing food are all as necessary at this time as at any other.

3. **Menopause.**—In a healthy woman menstruation ceases at the age of forty-four to forty-seven. There is considerable variation in this respect, the menses sometimes ceasing three or four years before that age or continuing three or four years afterward. It is very exceptional, however, for menstruation to cease before forty or to continue after fifty. This period of cessation of menstruation is known variously as the "menopause," the "climacteric," and the "change of life." The changes that take place in the uterus during and after the menopause have already been described (Chapter VI). They are similar to those occurring in all the genital structures; namely, a gradual atrophy of the functioning part (endometrium and muscular tissue), a general fibrous change and a slow, but decided, diminution in size, probably the result of ceasing ovarian secretion.

The menses usually cease gradually—that is, the flow may be less free or may continue a shorter time than usual, or the flow may be missed entirely for one or two periods. This partial and irregular absence of the menstrual flow may continue for one or two or three years before it ceases entirely. This gradual diminution of the menstrual flow is natural and there are frequently slight nervous disturbances ("hot flashes," etc.) that can hardly be classed as pathologic. But many of the symptoms that are ordinarily considered as part of the "change of life" are really not so; for example, increased menstrual flow, bloody discharge between the menstrual periods, leucorrhea, pelvic pain, and marked nervous disturbances. These are due to pathologic conditions.

They mean that something is wrong, and they require investigation, that the trouble may be remedied. This is important especially in the case of vaginal discharge, whether bloody or leucorrheal. It seems to be the general impression among women that irregular bloody discharges are natural during the "change of life." But such discharges are not natural—they usually mean either inflammation or cancer. One of the saddest things in gynecologic work is that a large proportion of the cases of cancer of the uterus are beyond the possibility of a cure when first examined. In such a case it is supposed by the patient, her friends, and all to often by physicians, that the slight bloody discharge which at first appears is "natural to the change of life," and so no attention is paid to it. Later, too late, they find that it is due to serious disease, which, because of neglect, has progressed to such an extent that it is beyond cure.

ABSENCE OF MENSTRUATION (AMENORRHEA)

A general theoretical consideration of the problem of amenorrhea will be found in Chapter XV, and the discussion here will be limited to the practical aspects of the condition.

Amenorrhea is the absence of menstruation for one or more periods between puberty and menopause. This definition includes the absence of the menses during pregnancy and lactation. This is known as "physiologic amenorrhea."

Pregnancy must always be taken into consideration in a case of amenorrhea, and before the amenorrhea is attributed to any other cause, pregnancy must be excluded—by the circumstances of the case or by questioning the patient or by an examination.

Amenorrhea from other causes is found principally in girls and young women in whom the function of menstruation has not yet been completely established. The age of puberty; i.e., the beginning of menstruation—varies within normal limits considerably. Girls begin to menstruate, as a rule, at the age of twelve or thirteen or fourteen. The beginning of menstruation may be postponed until the age of sixteen or seventeen without disturbance. Usually, however, after the age of sixteen, and often before that, if the menstrual flow does not appear, there are disturbances that indicate some departure from normal health, and the patient may be said to have amenorrhea.

Amenorrhea is not a disease, but only a symptom. It may be an indication of any one of several entirely distinct conditions, just as a cough may be an indication of laryngitis or bronchitis, or pneumonia or tuberculosis. When a patient comes complaining that she does not menstruate, the first thing to do is to determine **why** she does not menstruate; i.e., what disease or condition lies back of this symptom.

In practice it is convenient, for purposes of diagnosis and treatment, to divide the cases of amenorrhea into two classes—one class including those patients who have never menstruated and the other class including those who have.

(A) WHEN THE PATIENT HAS NEVER MENSTRUATED

A mother brings her daughter, aged fifteen or sixteen or perhaps eighteen, to you, stating that the girl has never become unwell. The mother is anxious to know why the girl does not become unwell and, of course, what should be done for her.

Causes

In such a case the absence of menstruation may be due to one of four causes, as follows:

1. Poor general health, with pronounced anemia.
2. Some obstruction in the genital canal.
3. Imperfect development of the uterus.
4. Imperfect functioning of ovaries.

Which of the causes is present in this particular patient? That you must find out by investigation, and the first step in that investigation is to determine the state of the patient's general health. Is she pale, weak, lacking in vigor, always tired, easily exhausted by light work? If so, the amenorrhea is probably due to the first cause mentioned.

1. **Poor General Health, with Pronounced Anemia.**—The next step is to search carefully for the cause of the poor vitality, with its resulting anemia. The mother usually thinks the poor health is due to the absence of the menses, while the fact is that the absence of the menses is due to the poor health, and the poor health is due to some general or local disease, the nature of which it is your province to ascertain.

Now, it would be out of place here to attempt to take up in detail the differential diagnosis of all the diseases which may cause deterioration of the general health, with marked anemia and amenorrhea. Some of the common causes are:

a. Tuberculosis is a very frequent cause of amenorrhea. It may appear in the form of tuberculosis of the lungs, or of the intestines or of the peritoneum, or of the glands or of the bones, or of the urinary organs—any of the various forms of tuberculosis. The proper questions must be asked to elicit the information necessary to establish the presence or absence of this disease.

b. Malaria, particularly in the chronic form, is a frequent cause of anemia in malarial regions.

c. Acute disease, such as typhoid fever, pneumonia, diphtheria, and the exanthemata occurring at puberty, may weaken the patient so much as to delay the beginning of menstruation for many months.

d. Heart disease following rheumatism in childhood may cause persistent and severe disturbances of nutrition.

e. Digestive disturbances or kidney lesion, or diseases of the nervous system, may cause a depression of vitality to such an extent that the patient does not menstruate.

f. Confinement indoors, exhausting studies, overwork, poor food, lack of exercise—any of these things [illegible] cause anemia with amenorrhea.

g. Chlorosis. In some cases we can find no definite local or general disease to account for the blood condition—the pronounced anemia. In this class come the cases of chlorosis, and of pernicious anemia and of the other so-called "primary" anemias. The differential diagnosis of these forms of anemia belongs to general medicine, and the diagnostic points are described under diseases of the blood. Chlorosis occurs so frequently in girls and young women that it is sometimes classed as a gynecologic affection, but it belongs to general medicine the same as the other blood diseases.

h. Some of the diseases due to functional disturbances in one or more of the endocrine glands, such as diabetes (pancreas) exophthalmic goiter or myxedema (thyroid), tetany (parathyroids), acromegaly (hypophysis), etc., quite commonly are associated with amenorrhea (see Chapter XV).

Suppose, however, that our patient is not anemic, but is rosy, robust and apparently in good general health. What then causes the amenorrhea?

2. It may be due to some **obstruction in the genital canal.** The obstruction is due to some malformation, such as imperforate hymen, or atresia of vagina or atresia of cervix uteri. These malformations are rare, the most frequent being imperforate hymen (Fig. 905).

Obstruction in the genital canal gives rise to no symptoms until puberty is reached. At the age of thirteen or fourteen or later the patient begins to feel very bad each month. At intervals of about four weeks she notices marked lassitude and loss of appetite, feels somewhat feverish and out of sorts, has pain in various parts of the body, more particularly in the back and lower abdomen. She complains just as a woman does when she is about to be unwell. Her mother thinks she is coming unwell but no flow appears. After a few days the pain and other disturbing symptoms subside and she feels fairly well until the next month.

After several months the pain and accompanying disturbances last longer —in fact, may become almost continuous—and the patient's general health begins to suffer. A swelling may appear in the lower abdomen or at the vaginal entrance.

Such a history makes a local examination imperative. In the local examination, if the condition be imperforate hymen, the vaginal entrance is found closed. There may be a bulging of the hymen due to the pressure of menstrual blood behind it. If the atresia is situated high in the vagina, the vaginal entrance is found open, but after the examining finger has been introduced for a short distance it meets an obstruction, consisting of a wall of tissue blocking the vagina. If there is a collection of menstrual blood behind the obstruction fluctuation may be obtained. Digital examination by the rectum will give additional information as to the location and length of the vaginal atresia and as to the amount of menstrual fluid collected behind it. In long-standing cases the vagina and uterus and even the fallopian tubes may be distended with blood.

In cases of atresia of the vagina there are very liable to be other malformations higher, and sometimes the uterus is entirely absent. If the patient is past the age of puberty and no collection of blood is found above the vaginal atresia, the strong probability is that the uterus and appendages are either absent or so poorly developed that menstruation would be impossible even though the vaginal obstruction were removed. Careful examination should be made to determine certainly whether or not the uterus is present.

But suppose the girl is healthy—good color, good general health, and no local malformation—what then causes the amenorrhea?

3. It may be due to **imperfect development of the uterus.** This poor development of the uterus may be simply part of a general under-development, or it may be limited to the uterus and appendages, the patient being otherwise strong and fully developed.

In some cases the imperfect development is so marked that it can be proved by examination (body of uterus very small). In other cases the imperfection is less marked—the uterus and appendages are apparently normal, as far as can be determined by ordinary bimanual palpation, and still the development has stopped short of perfection, as is shown by the fact that the patient does not menstruate and that treatment directed toward stimulating development brings on the menstrual flow.

4. It may be due to **defective ovarian function.** The subject of imperfect functioning of the ovaries and other endocrine glands is fully discussed in Chapter XVI. This disturbance is a very frequent cause of amenorrhea and scanty menstruation.

Treatment

The patients now under consideration are girls and young women who have never menstruated. If there are no marked local symptoms pointing to obstruction, the first step in treatment is to put the patient in the best possible general health. A local examination is not indicated at first in the absence of local symptoms. The anemia should be corrected, and the general health improved and the normal function stimulated by the following measures:

1. The long continued **administration of iron,** accompanied by arsenic or strychina or other tonics, as indicated by the conditions present.

2. **Curtail exhausting school duties,** immoderate piano practice and other acquisitions of modern life that keep the body too much indoors and in one posture, and that develop mental activity at the expense of physical strength.

The mind should be trained, of course, but it should be trained in a way that does not interfere with the development of the body. The age of puberty is sacred to the physical development of the girl and nothing should be allowed to interfere with it.

A step in the right direction is the introduction of regular gymnastic exercises in the curriculum of the public schools. This needs to be extended and combined with a certain amount of outdoor exercises.

The course of study in the public schools should be under such medical supervision that the pupils be not unduly taxed, and when it is seen that a girl is not doing well physically, her parents should be advised to take her out for a time and let her live the outdoor life that she needs. Such a step in time would turn many a girl from the path of imperfect development and lifelong invalidism, and cause her to become a healthy, robust and useful woman—an ornament to society and a blessing to all around her.

3. **Regular and Moderate Exercise.**—There are excellent general works on the various forms of exercise, and a careful study of this subject is advisable, for, in many affections, well-directed exercise is one of our best remedies. The orders to the patient will be about as follows:

a. Take five to ten minutes' exercise with a Whitely exerciser, or other good exerciser, each night after the clothing is loosened for retiring. The exercise should be taken regularly—every night without fail. It should be moderate at first, not more than five minutes, and the time lengthened as the patient becomes used to it. It should not be violent. Begin with correct standing and walking and then pass to the arm movements and the movements that involve the chest muscles, the expansion of the chest, etc. As the patient gets used to the work and can extend the time, other movements may be taken up, movements involving the abdominal and back muscles and the muscles of the hips and lower extremities. It is a good plan, however, to always take the arm movements, either at the beginning or end of each exercise period.

b. Take a walk of five to ten blocks (¼ to ½ mile) each day. It is best to have a regular time for this. This exercise should be regular and moderate, and deep breathing should be remembered (a deep breath every eight to ten inspirations) and correct easy position in standing and walking.

With this as with the indoor gymnastic exercise, it is not the length or amount of exercise so much as the regularity of it that accomplishes the desired result.

c. Other forms of outdoor activity, such as horseback riding, driving, rowing and the various outdoor sports are excellent, as they keep the patient out in the open air and sunshine and at the same time necessitate considerable muscular activity. They are particularly invigorating because they add to the necessary exercise a healthful interest and anticipation and enjoyment. But these things should not be allowed to interfere with the regular walk and gymnastic exercise—in fact, at the first regular gymnastic exercise and walk will probably be all the patient can take without fatigue, and it is only after these have been practiced for a time that the more active out-of-door sports can be undertaken without harmful fatigue. These latter are to be taken only in addition to the other when the patient is ready, and not in place of them.

4. **Regular meals and Suitable Food.**—An abundance of good nourishing food should be taken at regular intervals. At first the patient's appetite will probably be capricious and she will not care for much substantial food. Do not try to stuff her and do not tell her she must eat a great deal of this or that article of food, of which even the thought perhaps destroys what little appetite she has. Rather give the exercise that will after a time give her an appetite, and, after she gets so she is really hungry, tell her what article of diet she cannot have, leaving her to find her food from the other articles or go hungry. Thus by giving her an appetite and cutting off the unwholesome articles with which she has perhaps been accustomed to pamper herself, she will soon be taking an abundance of good substantial food and be glad to get

it. The result will be good blood, strong muscles, sound sleep, graceful carriage, healthy color, clear mind, sweet temper and a general attractiveness which can never be supplied by cosmetics and indolent luxury.

5. After the patient is well started on this regimen, say after one or two months, she may be given some of the emmenagogue preparations, provided the menstruation has not already begun. In some cases as soon as the patient is put in good general health the menstruation begins normally. In other cases the menstruation does not appear, even when the patient has been restored to apparently good general health.

In such a case the tonic regimen is continued and in addition some emmenagogue preparation is given. Corpus luteum is one of the best preparations for this purpose. It may be given in 5 gr. capsules, two or three times daily. If no effect is produced within a reasonable time it may be given hypodermatically.

If after two or three months of this treatment the menstrual flow does not appear, or at any time if marked local symptoms develop, make a vaginal and bimanual examination and determine whether there is any obstruction to the flow or any other pathologic lesion needing correction. If an obstruction (imperforate hymen or atresia of vagina) is found, it must be treated as described elsewhere under the organic lesion.

If no obstruction is found and the organs are apparently normal, it is then to be assumed that the trouble is due to imperfect development of the uterus—that is, that the organ has stopped short of perfection. We then employ measures to stimulate the uterus to functional activity.

The tonics, the exercise, the emmenagogues and the other measures mentioned tend in that direction. If the symptoms recur at regular intervals, indicating that this is the time when the menstrual flow is nearly ready to start, use hot sitz-baths, hot foot baths, and warm applications to the lower abdomen.

The propriety of intravaginal measures depends somewhat on the patient. In some patients the vaginal opening is large and the patient is not particularly nervous, and local treatment may be carried out without special trouble. In such a case applications of silver nitrate solution 4 per cent to 10 per cent to the cervix may be made every other day at the time when the precursory symptoms of menstruation appear. The hot douche also may be used two or three times daily.

In the case of a patient who is nervous and distressed by the local treatment, and particularly if the vaginal opening is very small, no intravaginal treatment should be employed without anesthesia, except the giving of hot vaginal douches.

It may be that an anesthetic is required to make a careful examination to determine whether or not there is any serious abnormality of the organs. In such a case it is well to have instruments ready for dilating the cervix, as that seems to act as a stimulant to menstruation in these cases. In some cases curettage is indicated as a local stimulant.

In a case of amenorrhea where the girl is engaged to be married, the question of the propriety of marriage sometimes comes up—the parents or the patient desiring to know whether it would be right for her to marry when she has never menstruated. The answer is, that if there is no organic lesion which in itself is a bar to marriage, marriage is perfectly proper, just the same as though the girl were menstruating regularly. In such a case the absence of menstruation is simply a functional disturbance, which will probably soon disappear under the influence of a happy married life.

(B) WHEN THE PATIENT HAS MENSTRUATED

When the patient has menstruated one or more times, the absence of menstruation is due to one of the following causes:

1. Some condition connected with pregnancy.
2. Some other forms of physiologic amenorrhea.
3. Poor general health, with anemia.
4. Acute general disease.
5. Local (pelvic) disease.
6. Operative removal of essential structures.
7. Obesity.
8. Nervous impressions.
9. Suppression of menses.
10. Endocrine disturbance.

1. **Pregnancy.**—*A. Normal Pregnancy.*—If the patient has previously been regular in menstruation, is in good health and has had an opportunity to become pregnant, the natural supposition is that she is pregnant, and until it is proved that she is not pregnant, nothing should be done that could in any way interfere with pregnancy.

The patient may assert positively that she is not pregnant, may even deny any possibility of pregnancy, but when after examination there is any suspicion in your mind, postpone all local treatment until after the next menstrual flow. If you doubt the patient's honesty, that is, if you think she may return and tell you that she menstruated when in fact she did not—tell her that she must come during the flow, that you may determine the character of the flow. In this way you can establish certainly whether or not she really menstruates.

In this matter of the **question of pregnancy** it requires considerable judgment and tact, on the one hand, to detect the cases of pregnancy, and, on the other hand, to avoid wounding the feelings of innocent persons by ill-advised questions. Concerning the question of pregnancy, the cases may be divided into three classes. In the first class come the girls and unmarried women in which, from the character of the trouble or from the known character of the patient, the possibility of pregnancy may be at once eliminated. These correspond very closely with the patients who have never menstruated and require the same treatment.

In the second class come the married women. In these an examination may be made at once and the diagnosis of pregnancy settled thus. If the diagnosis is still doubtful after examination, the patient is told that it is too early yet to be certain about it and she is directed to come again after a month or six weeks.

In the third class come the girls and unmarried women about whom you know but little—they may be all right or they may be all wrong; you simply do not know and hence must be cautious. In this class come also widows, divorced persons, women living apart from their husbands—all of whom, if pregnant, might wish to conceal the fact. Some of these patients are perfectly truthful with the physician, telling him their fears or leaving a clear opening for the asking of questions that would bring out the information. In other cases the patient gives the whole history of her case without any intimation of a misstep. Occasionally the patient tries deliberately to deceive the physician, hoping that in his examination or treatment something may be done that will bring about an abortion.

In such uncertain cases it is usually best for the physician to keep his thoughts to himself, and not to intimate any suspicion of pregnancy until some good evidence of it is found. Do not depend too much upon the history the patient gives. Just keep in mind that it may be all truth and it may be all falsehood. If the patient is a girl or unmarried woman, an examination need not be made at once. She may be placed on tonic treatment that will not interfere with pregnancy. This will put her in better condition for menstruation and in the meantime the case may be observed and developments watched for. If after several weeks menstruation does not appear, an examination may be suggested. If the patient was formerly married, or has taken local treatment or has had an examination made, an examination may be advisable at once. If the examination signs are not decisive either way, the patient may be kept on tonic treatment and another examination made after several weeks.

In this way the physician protects himself and at the same time gives the patient good treatment. If it turns out that no pregnancy is present, the patient need never know that pregnancy was suspected. On the other hand, if it turns out that pregnancy is present, nothing has been done that could possibly interfere with it. He has done what was right for the patient and has protected himself, and accordingly prevented the patient from making a fool of him, as some of the deluded "smart" ones try to do.

B. Extrauterine Pregnancy.—The evidences of tubal pregnancy have already been given in Chapter XI.

2. **Other Forms of Physiologic Amenorrhea.**—*A. Lactation.*—As a rule, a woman does not menstruate while nursing a baby. There are, however, many exceptions to this rule, especially after the first six months. Quite frequently a patient, while nursing her child, will begin to menstruate within five or six months after labor and occasionally within two or three months. This happens most frequently in those cases in which the mother has only enough milk to partly nourish the baby.

B. Beginning Menopause.—The age at which the menopause begins varies much in different persons. The average age is about forty-five, but it often begins somewhat earlier, in exceptional cases before forty. If the patient is past forty and the menstrual flow has been getting gradually less for several months, the menopause is probably beginning. There are two separate phenomena that usually accompany the climacteric and that may aid in the diagnosis—the "hot flashes" with some irritability and other evidences of nervousness, and the tendency to increase in the subcutaneous fat deposit. Neither one of these is pathognomonic, but both of them occurring in a patient past forty, with menstruation gradually diminishing, make the diagnosis of the climacteric fairly certain.

3. **Poor Health, with Pronounced Anemia.**—There is poor blood, poor general health and want of tone, secondary to some wasting disease or to chlorosis. The cause is determined by a careful general examination of the patient, including, when necessary, examination of the urine and of the sputum and of the blood. It is usually due to some chronic disease. It may come from any of the conditions already mentioned under anemia in patients who have never menstruated or from other troubles that reduce the patient's vitality. Among the latter may be mentioned prolonged lactation, pregnancies too close together, close confinement indoors with housework or children, and sameness of work day after day without stimulating variety.

4. **Acute Disease.**—Acute diseases, such as typhoid fever, pneumonia, the exanthemata, influenza or even a severe cold, may delay menstruation or cause it to be missed entirely, particularly if the attack comes about the menstrual time. On the other hand, the beginning of an acute disease may cause the menstrual flow to appear too soon or to be too free.

5. **Local (Pelvic) Disease.**—The local diseases that may cause amenorrhea, independent of their general effect on the blood, are those diseases that affect the integrity of the endometrium (from which comes the menstrual blood) or that affect the integrity of the ovaries (from which comes the menstrual impulse).

A. Hyperinvolution of Uterus.—The process of involution following pregnancy and labor may continue farther than normal, reducing the uterus below normal size and so modifying the endometrium as to interfere with menstruation. This is a rare condition, but must be kept in mind in considering a case of amenorrhea in a patient who has given birth to a child within a year or two. In one of the author's cases the patient was twenty-eight years of age. Three years before she had had a severe infection following the birth of her child and there had been no menstruation since. Bimanual examination showed the uterus to be very small. On account of other trouble it was necessary to open the abdomen, and the opportunity of inspecting the internal genital organs was offered. Everything was atrophic—the uterus, ovaries, tubes and round ligaments. The uterus was about half the normal size. Hyperinvolution may occur also following simple curettage for chronic endometritis, though that is even more rare.

B. Cirrhosis of the Uterus is the last stage of chronic metritis, that stage in which the wall of the uterus and the endometrium are largely converted into scar-tissue. There is loss of the functionating elements, marked diminution of the blood supply and consequent cessation of function before the appointed age.

C. Destruction of Ovaries by Disease.—The ovaries furnish the menstrual impulse, and when they are so damaged by disease that all of the functionating elements (graafian follicles with contained ova) are destroyed, and no corpus luteum is formed, menstruation ceases. This rarely happens, for even in extensive and destructive pelvic inflammation, enough of one ovary usually survives to continue menstruation, provided the patient's general health is not too much affected.

6. **Operative Removal of Structures.**—The structures essential to continual regular menstruation are the uterus and some functionating ovarian tissue.

A. Hysterectomy.—The removal of uterus ordinarily means cessation of menstruation. In certain cases of supravaginal hysterectomy for fibroids, sufficient of the lower part of the corpus uteri may be preserved to continue menstruation (Chapter XIV). Of course, such an operation constitutes only a partial amputation of the corpus uteri. The removal of the cervix uteri alone has practically no effect on menstruation.

B. Double Oophorectomy.—The complete removal of both ovaries (removal of all ovarian tissue in the pelvis) causes menstruation to cease, either at once or within a short time. In many cases, even with both ovaries badly damaged, enough ovarian tissue may be left to continue menstruation. In suitable cases this is the practice ordinarily followed. To secure the desired result, however, the ovarian tissue left must continue to functionate.

On the other hand, in exceptional cases, when both ovaries have supposedly been completely removed, the patient has continued to menstruate and has even become pregnant. That means, of course, that some ovarian tissue was left. Some part of the normal-shaped ovaries may have been unwittingly left or there may have been lobulation of one ovary. Islands of ovarian tissue, from malformation of ovary, are occasionally found in the pelvis, either close to the normal site of the ovary or at some distant part of the broad ligament.

The removal of one ovary has little or no effect on menstruation, provided the other continues to functionate. The removal of one or both fallopian tubes has no effect on menstruation.

7. **Obesity.**—The condition of the system associated with the excessive deposit of fat very frequently causes diminution in the menstrual flow and may cause it to cease altogether for a time. This may occur with obesity in girls as well as in older women.

8. **Nervous Impressions.**—Nervous impressions may delay or stop the menses for a few months, or delay their appearance if occurring at puberty. Among these may be mentioned: a long journey (particularly on shipboard), change of residence from country to city or vice versa, extraordinary grief, joy, or anxiety, or exciting work, study (as in preparing for examination), taking up a new occupation, financial troubles, love affairs and difficulties in home life. Any of these may cause an expected menstruation to be missed.

9. **Suppression of Menses.**—Sudden cessation of the flow after menstrua-

tion has started may be due to extensive chilling of the surface, or to a marked nervous shock, as from fright or grief.

10. **Endocrine Disturbance** is an important cause of amenorrhea in patients who have menstruated as well as in those who have not. Imperfect functioning of the ovary or other endocrine gland is partly responsible for amenorrhea and scanty menstruation ordinarily attributed to poor general health, to acute general or local diseases, to obesity and to nervous impressions. It is wholly responsible in still other cases.

Treatment

The treatment required is indicated by the particular abnormal condition present. The methods of treatment for the various organic diseases are given in the appropriate chapters.

In **anemia** employ the course of tonic treatment followed by emmenagogues, previously described for anemia in patients who have never menstruated.

In married women, with no decided organic lesion, the poor general health may be due to prolonged lactation, to pregnancies coming too close together, to the worry and care of children, with, perhaps, too much housework besides, or to too close confinement indoors with monotonous housework. Close confinement in the house, with the same round of housework day after day and month after month, without a diverting change of work or a stimulating object to be attained, is enough to produce digestive disturbance, malnutrition, anemia and general depression, both physical and mental. In the same way the woman who devotes her time largely to society may, by the constantly repeated round of social exactions, become completely "fagged out." Also, the woman who does office work may be worn out by having to do the same work day after day for months and years.

In all such cases, besides the regular tonic course, a change or break in the regular routine is advisable. This change should be a decided one. It should produce not only a change in physical activity, but also should change the current of thought and furnish a new direction for mental activity. The prescription to bring about these changes will vary much in different cases, depending to a large extent on the circumstances and inclinations of the patient. With some it will be a prolonged trip abroad, leisurely visiting places of interest; with others, a trip to the seashore or to the mountains for a few weeks or several months. In the cold, cloudy months of the winter a sojourn in the South may be advisable; while, to escape the heat of summer, the northern lake resorts are available in addition to the mountains and the seashore. In other cases a few weeks' rest in the country will answer the purpose, or a prolonged visit with friends in another city, or the employment of help, so that the patient has less routine housework or office work, and more time for rest, amusement, outdoor exercise and some diverting leisure pursuit, such as photography, painting, music, fancy work, or one of the many other things which furnish physical and mental diversion. A change of thought and action for a few weeks or a few months, as the case may be, is one of the best tonics, and, when combined with suitable medication and hygiene, it may make one "feel like a new person." The regular work can then be taken up with interest and pleasure, and can be executed with vigor and satisfaction. Keep in mind, however, that, to continue in good health, the patient must take time for rest, nourishment, exercise and relaxation.

Obesity.—When the patient is considerably heavier than she should be, particularly if she has increased in weight recently, she should be placed on treatment for correcting the faulty metabolism that results in fat deposition. The systematic treatment of this condition belongs to general medicine and cannot be considered in detail here. The author has obtained good results in these cases from the granular effervescent Vichy and Kissingen salts given on alternate days—one day the Vichy and the next the Kissingen, etc. This should be continued for two or three months and combined with a more or less strict diet. Even when the weight is not noticeably reduced, the metabolism is improved, the patient is placed in better general health and hence in better condition for menstruation. Of course, when the stout patient is anemic, she requires a course of iron along with the other treatment. The value of certain organotherapeutic preparations is discussed in the next chapter.

When the amenorrhea is apparently due to **nervous impressions** (a long journey, change of environment, grief, joy, anxiety), no treatment is required except for accompanying disturbances. When the patient becomes accustomed to her new surroundings, the menses will probably return. In the meantime any symptomatic disturbance should be treated—a sedative if needed, a tonic if indicated, an emmenagogue at once if thought best, or later if the menses do not appear.

Suppression of the menses requires rather active treatment. First satisfy yourself that you are not being deceived; i.e., that no pregnancy is present. Then employ measures to produce pelvic congestion and to overcome the nervous inhibitory influence which has been started by exposure to cold or nervous shock, or whatever it was that caused the sudden suppression of the flow. If the patient is very nervous or in pain, give sedatives in sufficient doses to set the nerves at rest. Have the patient take a warm sitz-bath (a mustard foot bath may be given at the same time), then have her go to bed, covered up warmly and hot applications made to the lower abdomen and genitals. Hot drinks, that tend to start up the secretory action of the skin and other organs, are then advisable. If the bowels have not moved well, order a large enema of warm water or warm soap water.

Medication will be largely symptomatic. In sudden suppression of the menstrual flow (from exposure to cold or nervous shock), accompanied by full pulse and feeling of fullness in the heart and in the pelvis, give drop doses of tincture of aconite every half hour until the circulatory tension is relieved. Used in conjunction with the measures above mentioned, this often causes the flow to return in a few hours. Tincture of pulsatilla, given in two-drop doses every three hours, is sometimes effective in relieving the distress and restoring the flow. If there is severe pain, phenacetin and codeine may be required.

Endocrine disturbance, of course, requires treatment directed toward the gland or glands at fault, for which see Chapter XV.

SCANTY MENSTRUATION

A diminution in the menstrual flow, or a too slight flow from the beginning of menstruation, is caused by the same condition that leads to absence of the menses (with the exception of those obstructive lesions that prevent the escape of any blood), and the treatment also is practically the same.

EXCESSIVE MENSTRUATION (MENORRHAGIA)

The menstrual flow may be too free or it may last too long. In either case the condition is known as excessive menstruation or menorrhagia. The normal duration of the flow and the amount of blood lost varies much in different patients. With each patient, however, the duration of the menstrual flow and the amount of blood lost is fairly constant—that is, the patient menstruates about the same length of time and loses about the same amount of blood at each normal menstruation. If there is decided increase in the amount or in the duration of the flow, the patient may be said to menstruate excessively, though the same amount and duration of the flow in another individual might be normal if usual with her. Each patient is somewhat of a law unto herself in this respect. Therefore, to make the diagnosis of excessive menstruation, we need to know something of the patient's menstrual history.

Etiology

Excessive menstruation is due (1) to conditions which cause congestion of the uterine mucosa and (2) to conditions which disturb the function of the ovary or other endocrine glands. The bleeding in the cases of the first class may be due largely to secondary disturbance of ovarian function, but the endometrial congestion is the obvious lesion and requires removal.

1. **Congestion of the endometrium** may be due to hyperplasia of the endometrium, endometritis, subinvolution, malposition of uterus, myoma, cancer, pelvic inflammation or tumor of the ovary or broad ligament. It may be caused also by diseases that interfere with the return of blood from the pelvis, such as heart disease with failing compensation, obstructive liver diseases and abdominal tumors. Also affections that cause frequent straining effort, such as constipation, chronic diarrhea, stricture of rectum and chronic cystitis, tend to uterine congestion and excessive menstrual flow.

In some cases no lesion is found, but the pelvic congestion is due to one of the following conditions:

a. Work that favors pelvic congestion, such as standing for hours (as clerks must do), or running a sewing machine for hours (as is done by the seamstress), or lifting and working about the sick (as is done by the nurse), may lead to excessive menstruation. Long automobile rides over rough roads might be mentioned in this connection.

b. Excessive or violent exercise, as is sometimes taken in the excitement of outdoor sports.

c. Recent marriage. In the first few months after marriage there is frequently some increase in the menstrual flow, but ordinarily it need cause no alarm, for it usually disappears as the pelvic organs become accustomed to the changed conditions.

It must be kept in mind, also, that an early abortion coming about the menstrual time, or an early tubal pregnancy with rupture or tubal abortion at the menstrual time, may very closely resemble an ordinary menorrhagia, with some extra pain and a few blood clots.

2. Endocrine disturbance seems to be wholly responsible in some cases.

Treatment

It is convenient to divide the treatment into (A) treatment during the flow and (B) treatment between the periods.

(A) Treatment During the Flow

You are called to see a patient who is menstruating, the flow being too free or having lasted too long. By questioning the patient it can usually be determined certainly that it is a regular menstrual flow and not bleeding connected with an early abortion or threatened abortion, or tubal pregnancy. As the patient is menstruating, of course, no examination is made unless there are indications of serious trouble. If the questioning shows clearly that the trouble is simply excessive or prolonged menstruation, the patient may be given some uterine astringent internally.

1. **Internal Uterine Astringents.**—Ergot, in its various forms, is one of the most reliable of the uterine hemostatics for internal use. A satisfactory way of administering it is ergotin and nux vomica in a capsule. Or the fluid extract or other preparations may be given. Ergot is efficient in all forms of uterine bleeding, except when pregnancy is present. It must never be given when there is a suspicion of pregnancy.

Calcium chloride, also, is used as an internal hemostatic. Strychnia and other tonics tend to tone up relaxed muscular tissue and may thus diminish bleeding.

2. **Laxatives.**—At the beginning of the treatment the bowels should be moved well with a saline purgative, and after that laxatives should be given as needed to secure one or two good bowel movements daily.

3. **Rest in Bed.**—The patient should stay in bed during the flow if possible. If the bleeding is at all severe, this is imperative.

The employment of the three measures above mentioned will usually diminish the flow decidedly within twenty-four hours.

4. **Sedatives.**—If the patient is nervous and restless or if there is dysmenorrhea (a very frequent accompaniment of menorrhagia), give potassium bromide, 15 gr. every three hours, as needed to give rest and sleep. This makes the patient much more comfortable, and, in addition, the bromides

(particularly potassium bromide) are supposed to aid somewhat in checking excessive menstrual flow.

If the pain is severe, the bromides will probably not be sufficient to relieve it, and then opium is indicated. Besides checking the patient's sufferings, the opium has a decided effect toward temporarily checking the uterine bleeding. When opium is given, it should be in such form that the patient does not know what she is taking. A very good formula is ergot in one grain and opium one-half grain, given in a pill and repeated every six to eight hours as needed.

5. **Medicine for Special Indications.**—If there is heart trouble with failing compensation, digitalis or other heart stimulant is indicated.

If there is a troublesome cough, or bladder or rectal disturbance, or other affection, give medicine for the same.

6. **Vaginal Tamponade.**—Another method and a very efficient one for temporarily checking a serious loss of blood during menstruation is to tampon the vagina firmly, the same as for hemorrhage from any other cause. This temporarily stops the loss of blood from the relaxed atonic uterus and preserves that much for the anemic patient, who can ill afford to lose it. This packing may be removed in one or two days, and another applied.

The systematic use of this method in suitable cases was brought before the profession by Gehrung, who, from an extensive experience with it, states that no ill effect follows this arbitrary checking of the menstrual flow after a proper amount of blood has been lost. It is a useful temporary expedient for preserving to the anemic patient, over a few menstrual periods, the blood which she can ill afford to lose by stopping the flow after the third or fourth day of menstruation. In this way the downward course of the trouble may be checked and the patient's condition held stationary, while other measures are employed to overcome the cause of the excessive menstruation.

(B) Treatment Between Menstrual Periods

Having checked the flow temporarily, the next thing is to prevent the recurrence of the excessive menstruation. The indications in such cases are:

To reduce congestion of the uterus and other pelvic structures.
To tone up the uterus.
To put the patient's blood in good condition.
To correct local diseases.
To correct ovarian function.

The measures for accomplishing these objects are as follows:

1. **Laxatives.**—There should be one or two good bowel movements daily, and at the menstrual period the bowels should be given a special clearing out.

2. **Uterine Tonics.**—Ergot is one of the best drugs for toning up an atonic uterus. It produces also some constriction of the blood vessels and thus diminishes the amount of blood in the organ. This has a marked effect in checking excessive loss of blood. The ergotin and nux vomica combination is an excellent form in which to give the ergot. It is a good general tonic. At the menstrual period it is well to increase the frequency to every six hours.

Stypticin, styptol or other hemostatics mentioned under "Treatment During the Flow," may be administered during the intermenstrual period.

3. **General Tonic Remedies.**—Menorrhagia is not a disease. It is only a symptom, and the physician must find what is back of it as an etiologic factor.

If anemia is present, the cause must be sought and the patient placed on the required tonic regimen and medication.

If there is heart disease, portal obstruction or any other condition that interferes with the return of blood from the pelvis, it must receive appropriate treatment.

4. **Correction of Local Disturbances.**—Any local disease present should be determined and treatment instituted accordingly. This is a very important part of the treatment of menorrhagia and tends more than anything else to bring about a permanent cure. The pelvic disorders that may cause menorrhagia have just been enumerated and the various methods of treatment are given in the appropriate chapters.

5. **Correction of Ovarian Function.**—Ovarian function is aided to some extent by the various measures already mentioned. In many cases, however, the other measures should be supplemented by direct endocrine treatment, details of which are given in Chapter XV.

(Metrorrhagia (bleeding between the menses) is considered under "Bloody Discharge" near the end of this chapter.)

PAINFUL MENSTRUATION (DYSMENORRHEA)

Dysmenorrhea is the most troublesome of the menstrual disturbances, causing many women to suffer from one to several days every month. In some cases the suffering is so severe that menstruation constitutes a monthly torture, which, aside from the immediate pain, leaves the patient worn and weak for many days afterwards, and she lives in constant dread of the next menstrual period. Even in the milder cases the constant recurrence of pain and physical and mental depression may gradually induce a serious condition of malnutrition and neurasthenia.

Dysmenorrhea is not a disease, but only a symptom. It is caused by a great variety of conditions and is a symptom of many pelvic diseases. However, no one organic lesion has been shown to be the essential or sufficient cause of menstrual pain, for every condition so considered at one time or another has been found to exist in some instances without accompanying menstrual pain.

It is apparent that in practically every case, dysmenorrhea is due to a combination of abnormal conditions, either local or general or both. The work of the physician in each case is (a) to determine the abnormal conditions present in that particular case, (b) to form an estimate of the relative importance of each in the causation of the menstrual distress and (c) to treat the patient accordingly.

It has been customary to group the cases of dysmenorrhea into four classes as follows, each class supposedly representing distinct etiologic factors:

Neuralgic or Ovarian Dysmenorrhea.
Congestive or Inflammatory Dysmenorrhea.
Obstructive or Mechanical Dysmenorrhea.
Membranous Dysmenorrhea.

Neuralgic Dysmenorrhea is neuralgia of the ovarian, uterine and other pelvic nerves, coming on at the menstrual period because of the increased pelvic congestion with disturbance of ovarian function and the greater impressionability of the nervous system generally at that time.

The pain is neuralgic in character, i.e., sharp and variable. It radiates from the ovarian region of one or both sides to the uterus and to the iliac, abdominal, lumbar and sacral region. Not infrequently it extends down the thighs. In a large portion of the cases there is a severe attack of headache at some part of the menstrual epoch and occasionally a distinct neuralgia in some other part of the body. The pain appears to be independent of the character of the menstrual flow. It may be most intense a day or two before the flow or it may come on after the flow, or it may come and go during the whole time. Thus it is erratic and is likely to vary much in the different menstrual periods without apparent cause. It occurs usually in women of a neuralgic or rheumatic diathesis. Neuralgia or rheumatic pains are often felt in the intermenstrual periods, either in the pelvis or elsewhere. Hyperesthesia over the abdominal surface and pain are frequently noticeable, and this is much increased at the menstrual time.

This form of dysmenorrhea is liable to be associated with anemia, indigestion, neurasthenia, hysteria and allied disturbances. Patients with rheumatism and gout are also particularly prone to menstrual pain without apparent causative lesion in the pelvis. In the cases of so-called "neuralgic" dysmenorrhea, ovarian pain usually plays a prominent part—so prominent that this is sometimes referred to as "ovarian dysmenorrhea."

Congestive or Inflammatory Dysmenorrhea is due to congestion within the pelvis, particularly congestion of the uterine adnexa. This congestion may be due to some inflammation in the uterus or around it, or it may be due to some non-inflammatory condition, such as uterine displacement, or a tumor of the uterus or vicinity, or a functional pelvic congestion.

The pain is that of inflammation, and is felt as a soreness or throbbing pressure in the pelvis or back. It may radiate into the iliac regions, or up the spine or down the thighs. If the inflammation is principally in one side of the pelvis, the pain is most severe there. The pain is usually most severe the first day or two of the flow, but may last all the time. It may begin a day or two before the flow, and this is especially liable to occur in those cases of inflammatory trouble involving the ovary. There is also much general soreness through the pelvis, which is increased by walking or standing.

The diagnostic sign of this variety of dysmenorrhea is the character and constancy of the pain and the fact that there is trouble between the menses—evidence of inflammation or displacement or tumor or something that keeps up chronic pelvic congestion. The various causes of pelvic congestion are mentioned in detail under menorrhagia.

Obstructive or Mechanical Dysmenorrhea is, as its name implies, dependent on the obstruction to the outflow of the menstrual blood. The obstruction may be due to circular stenosis of the canal from imperfect development, or from cicatricial narrowing or from spasmodic constriction of the circular muscle fibers, or from swelling of the uterine mucosa. It may be due also to a sharp bend in the canal due to flexion of the uterus—usually an anteflexion (see Figs. 919, 921, 922, and 923). The obstruction is usually found about the internal os, though in very exceptional cases it may be at some other point along the canal or at the external os. The canal may be narrowed by a tumor situated in the cervix or outside the uterus. A small polypus within the uterus may drop into or against the internal os and block it. Again, the menstrual blood may contain clots, which are expelled with difficulty even when the canal is of normal size.

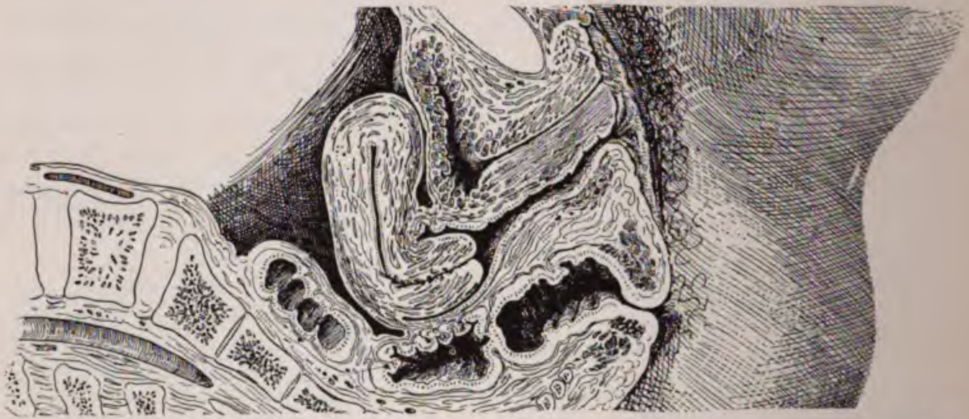


Fig. 919.—Anteflexion of the cervix uteri. In this condition the axis of the cervix points toward the examiner, as in retroversion, though the corpus uteri is well forward.

The characteristic of mechanical dysmenorrhea is that the pain is paroxysmal in character, apparently corresponding to painful uterine contractions brought about by the effort of the uterus to force the blood past the obstruction. The pains are periodical—very severe at times, with intervals of rest between—somewhat on the order of the pains of a miscarriage. When the menstrual flow is freely established, the severe pain usually disappears.

Dysmenorrhea due entirely to mechanical causes, or obstruction, is rare. There are usually complicating conditions that are as important as, if not more important than, the obstruction. The dysmenorrhea of young women, so frequently associated with anteflexion, was for a long time supposed to be due to obstruction in the canal. But it is now known that the obstruction is only one of the factors, and in most cases one of only secondary importance.

Membranous Dysmenorrhea is the term applied to that form of painful menstruation accompanied by the expulsion of membrane from the uterus. The membrane is usually passed in small pieces, though occasionally it is thrown off as a complete cast of the interior of the uterus. It consists of the superficial layers of the uterine mucous membrane, and is thrown off as the result of nutritive changes which are not yet understood.

The pains come with the flow and are paroxysmal—of the same character as the pains of mechanical dysmenorrhea, but very severe, resembling labor pains. After these have continued for several hours or a day or two, pieces of the membrane are expelled. There is then relief unless other pieces pass. The membrane, mixed with the menstrual flow, is the diagnostic sign of this form of dysmenorrhea. Care must be exercised not to confound it with miscarriage. It usually recurs every month or so and may last for years. The cause is not definitely known.

In regard to the above classification, with the exception of the cases of membranous dysmenorrhea, it does not make a very satisfactory grouping of the cases. In a few patients the dysmenorrhea apparently belongs entirely to one of the forms mentioned; i.e., neuralgic or inflammatory or obstructive. In most cases, however, there is such a mixture of neuralgic, congestive and obstructive features that it is impossible to assign the case exclusively to any one of these classes. For the purposes of diagnosis and treatment, it is convenient to divide the cases of dysmenorrhea into two groups—the first group including the cases of dysmenorrhea in the virgin and the second group including the cases of dysmenorrhea in the married woman.

(A) DYSMENORRHEA IN THE VIRGIN

The patient, a girl or unmarried woman, comes complaining of pain at the menstrual period. The pain may be so severe that the patient is obliged to go to bed for one or two or three days at each menstrual period, or it may be less severe, so that she is able to be up and about, but is miserable. Sometimes the pain is very severe, but going to bed gives no relief. The pain may have been marked from the first menstruation or it may have been slight at first, with gradual increase since. There is usually a decided difference in the pain in the different menstrual periods, being much more troublesome at some periods than at others. In many cases the pain begins a day or two before the flow. It is usually much relieved within twenty-four hours after the flow is well established.

Along with the menstrual pain there may be loss of appetite, nausea, lassitude and neuralgias. There is nearly always decided weakness during the flow and for one to several days thereafter. Menstruation may be otherwise normal, or there may be scanty menstruation or excessive menstruation. In many cases the patient has no particular disturbance during the intermenstrual period.

Causes of Dysmenorrhea in the Virgin

The causes are varied, but there is one group of conditions that overtops all others in the frequency of occurrence, namely,

1. **Neurotrophic Dysmenorrhea.**—In the majority of cases of dysmenorrhea in the virgin there is a combination of conditions, comprising anteflex-

ion of the cervix, some stenosis of the cervical canal and marked hyperesthesia of the uterine tissues, especially in the neighborhood of the internal os. This condition is a very important one on account of the frequency of its occurrence and the suffering it causes, and the stubbornness with which it resists treatment in many cases. The cause of the pain in these cases was for a long time supposed to be due to the narrowing of the canal at the internal os by the anteflexion present with the consequent obstruction to the outflow of menstrual blood. That the obstruction does play some part is shown by the fact that when the obstruction is removed the pain is usually considerably diminished. But simple removal of the obstruction (dilatation of cervical canal) does not always relieve the patient entirely, and in some cases the relief from this measure is slight and wanting, showing conclusively that the obstruction is not the only factor in the case. Again, it is a matter of common observation that other patients, with as much or more anteflexion and obstruction as are found in these cases, have no dysmenorrhea. In 37 cases of decided anteflexion, reported by Judd, 9 were without menstrual pain, 19 had menstrual pain beginning before the flow and 9 had only premenstrual pain. In 26 cases of anteflexion in the unmarried reported by Hyde, 5 had no menstrual pain, 20 had menstrual pain beginning before the flow and 1 had pain only after the flow. So the essential disturbance must be sought further. Endometritis has been put forward as the cause of the pain—at least of that portion of it which is not relieved by the removal of the obstruction. But this hypothesis also fails. In not a few cases of dysmenorrhea persisting after dilatation, the mucosa, removed by curettage, has been found to be practically normal. On the other hand, many patients with decided endometritis have no particular menstrual pain.

There is one pathologic condition that seems to be fairly constant in the class of cases under consideration, and that is hyperesthesia or marked irritability of the nerves of the uterine mucosa and muscles, especially in the neighborhood of the internal os. This is noticeable on sounding the uterus and especially on dilating the internal os without anesthesia. It is indicated also by the painful muscular contraction or uterine "cramps" occurring without apparent cause. The theory that the essential or underlying condition in these cases is hyperesthesia of the mucosa and muscle due to a **nutritive disturbance**, affecting the nerves and other tissues, seems to be the most tenable one. It explains better than any other hypothesis yet advanced the various phenomena observed. It shows why the symptoms may persist to a greater or less extent after removal of the obstruction at the internal os and after removal of the hyperplastic mucosa. It shows why the symptoms occur in patients with no obstruction and with no decided structural change in the mucosa. It shows why measures directed toward improving nutrition and allaying nerve irritability will sometimes produce decided improvement without any local treatment. In short, it explains what has already been worked out clinically—that the narrowing of the canal and thickening of the endometrium are simply complications that may or may not be present. When they are present they aggravate the trouble and require treatment. But unless the nutritive disturbance of the uterine muscle and mucosa is also improved sufficiently to restore the nerves to fairly normal condition, the pain will continue to a considerable extent.

The marked effect of pregnancy and parnutrition in these cases points strongly to its being largely a nutritive disturbance. Pregnancy has a most profound influence upon the nutrition of the uterus. To be sure, the parturition effectively overcomes the stenosis, but this does not account for the uniform and marked benefit, for we have already found that in many cases the stenosis is not an important factor. The beneficial effect of curettage in these cases is likewise due, to a large extent, to its marked stimulation of the nutrition of the uterus.

Another point in favor of the supposition that this trouble is essentially a nutritive disturbance affecting the whole uterus (both muscular tissue and mucosa) is the fact that it is very frequently accompanied by evidences of imperfect development. Such cases are referred to as cases of "infantile uterus." The evidences of imperfect development are late beginning of the menses, irregular menstruation and decided anteflexion of the cervix (failure of the cervix to take its proper direction across the vaginal canal). In fact, the association of imperfect development with this form of dysmenorrhea is so common that some writers attribute the dysmenorrhea to the imperfect development. It seems, however, that a better view of the matter is that the imperfect development and the dysmenorrhea are both due to the same cause—viz., poor nutrition.

We may go a step further and say that these two conditions—imperfect development and neurotrophic dysmenorrhea—are due to poor nutrition largely at a certain period of life—namely, at the period of puberty. The victims who suffer most are usually women who during puberty were poorly nourished from a physical and developmental standpoint, and were subjected to influences that would retard uterine development. In many cases this poor nutrition persists, and is only too apparent when the patient comes to the physician to secure relief from the dysmenorrhea. In other cases the patient, having been for some time out of school and taking more fresh air and sunshine and exercise, has acquired good blood and a good color. But that has not been sufficient to correct the evil effects of a pernicious regimen during puberty—a regimen which prompted mental activity at the expense of physical development.

Recent studies indicate that the poor nutrition of the ovary also is an important factor in this symptom-complex. The bearing of ovarian hypofunction and other endocrine disturbances on menstrual pain is discussed in Chapter XV.

2. **Membranous Dysmenorrhea.**—This form of dysmenorrhea, or rather the meaning of the term, has been explained. The cause and exact pathology are still in doubt. It is sometimes designated as "exfoliative endometritis," though careful examination of the exfoliated membrane has shown that in some cases no endometritis is present; e.g., by Ehrenfest (American Journal of Obstetrics, 1908).

Membranous dysmenorrhea is a comparatively rare affection. It usually appears early in sexual life, though some cases have been reported in which the disease first appeared in middle life. It usually extends over several years. At certain menstrual periods the endometrium is cast off and appears in the menstrual discharge as shreds. Occasionally the mucosa is cast off as one piece, forming a cast of the uterine cavity. The detachment and expulsion of a membrane with the menstrual flow (decidua menstrualis) may take place when the endometrium is practically normal in structure or when it is the seat of one or more of the several inflammatory and nutritive changes already described. The expelled pieces will, of course, exhibit whatever structural change is present in the endometrium; consequently in a series of cases of membranous dysmenorrhea, examination of the membrane may show many different inflammatory and nutritive changes, none of which are peculiar nor distinctive of membranous dysmenorrhea, but due to independent pathologic conditions in the endometrium are only accidental findings.

Membranous dysmenorrhea is undoubtedly due to a marked nutritive change, but just what lies back of this nutritive change has not been certainly determined. Lawrence, in reporting a number of cases, advanced the idea that the condition is usually due to pelvic inflammation following an attack of one of the exanthemata near puberty. He reported 42 cases of membranous dysmenorrhea in which there was present tubal or ovarian disease requiring operation. In 19 cases the disease was unilateral and in the remaining bilateral. In 33 of the 42 cases the trouble appeared, from the history, to have started from an attack of scarlatina, measles, mumps, rheumatism or smallpox. In nearly all (the report is not definite) there was no further membranous dysmenorrhea after the removal of the pelvic disease. He concludes that membranous dysmenorrhea is due to trophic changes in the endometrium secondary to adnexal disease, and that this adnexal disease is usually a sequela of one of the exanthemata occurring near puberty. He concludes also that the adnexal disease is usually unilateral at first and may be prevented from extending to the other side by prompt attention. As a result of these conclusions, he holds (a) that tubal and ovarian complications occurring with the exanthemata near puberty should be watched for and treated, (b) that in every case of membranous dysmenorrhea a careful history should be obtained with that point in view, (c) that when unilateral adnexal disease is found, prompt operation should be carried out to prevent the trouble becoming bilateral, and (d) that the facts in the case "would seem to warrant removal of the tubes and ovaries on one or both sides when shreds or casts are a part of painful menstruation."

The facts brought out above are certainly interesting, and study along this line may help to clear up part of this subject. With the last conclusion, however, the author must differ most decidedly. Removal of the adnexa on one or both sides should, as a rule, be made only for a distinct adnexal lesion and not simply for painful menstruation, whether accompanied by shreds of tissue or not. The fallacy of operating simply for the dysmenorrhea is shown by the fact that the dysmenorrhea may be as severe after operation as before. This fact was brought out in the discussion of the above paper by L. H. Dunning, who stated that "one of the most severe cases of membranous dysmenorrhea he ever saw occurred in a woman after he had removed bilateral pus tubes and both ovaries. She menstruated for two years afterward and had membranous dysmenorrhea." In a previous paper Dr. Dunning had reported a case of membranous dysmenorrhea which persisted after abdominal section and treatment of the adnexal disease, and finally yielded to intrauterine applications of electricity.

Concerning diagnosis of membranous dysmenorrhea in the virgin, the passage of shreds of membrane with the menstrual flow establishes the diagnosis. There is no other affection of virgins presenting such symptoms. It is well, however, to have some of the membrane saved for inspection and microscopic examination (Fig. 920), for the patient may be deceived by blood clots or shreds of bloody mucus. It must be kept in mind, also, that in certain cases the supposed virgin may not be a virgin, and that, consequently, the supposed "decidua menstrualis" may be a decidua of a different character.

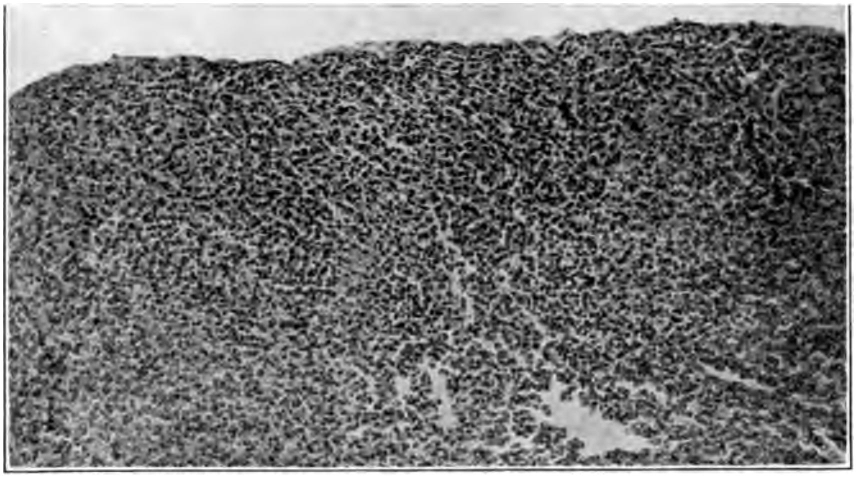


Fig. 920.—The membrane in a case of membranous dysmenorrhea. This thrown-off portion is the compact zone of the endometrium. Round cells and polynuclear cells are scattered among the stroma cells. Gyn. Lab.

3. **Atrophy of Uterus.**—In certain cases in virgins past 30 years of age and also in sterile married women there seems to be some atrophy of the uterus, which has failed to receive the stimulus of pregnancy. The patient had no particular pain in her earlier years, but gradually menstrual suffering has appeared, and examination shows no lesion, except a rather small atrophic cervix, with more or less stenosis. This is really a form of neurotrophic dysmenorrhea, but is due to trophic disturbance in later years instead of during the developmental period. This is one of the classes in which the stem pessary is sometimes advisable.

4. **Backward Displacement of the Uterus.**—Painful menstruation is one of the symptoms frequently produced by marked retrodisplacement of the uterus. Kelly found that of 229 consecutive cases of dysmenorrhea admitted to Johns

Hopkins Hospital, 41 per cent were associated with retrodisplacement of the uterus, 37 per cent with pelvic inflammatory disease, and 11 per cent with fibromyomata. The proportion of cases of retrodisplacement is, of course, much larger in patients who have borne chidlren than in virgins. In 184 cases of retrodisplacement of the uterus, reported by A. M. Judd, 108 suffered with menstrual pain, either during the flow or immediately before it. A slight retrodisplacement of the uterus, less than the second degree, does not give rise to particular disturbance and should not be accepted as the cause of dysmenorrhea.

5. **Myomata of the Uterus.**—Painful menstruation is a frequent symptom in uterine myomata, particularly when the nodules are interstitial or submucous.

6. **Chronic Pelvic Inflammation** (salpingitis, oophoritis, cystic ovary).—Salpingitis is comparatively rare in the virgin, for the various causes of pelvic inflammation in the married woman are not present. Chronic oophoritis from local circulatory and nutritive disturbance is more frequent and may give rise to some dysmenorrhea.

7. **Pelvic Tuberculosis** is not so rare as was formerly supposed, and should be thought of whenever there are evidences of chronic pelvic inflammation in a virgin.

8. **Ovarian or Broad Ligament Tumors** may arise in the virgin and give rise to the usual symptoms and signs, which are detailed in the appropriate chapter.

9. **Inflammation of Adjacent Organs**—bladder, rectum, appendix. Any adjacent inflammatory trouble is likely to be considerably aggravated by the menstrual congestion. Occasionally the trouble is so slight as to be hardly noticeable except during the menstrual exacerbation. In such a case it may at first be considered one of the usual varieties of dysmenorrhea, but careful watching will show symptoms pointing to the organ involved, and evidence of such disturbance may be found in the intermenstrual period. Chronic appendicitis not infrequently presents decided menstrual exacerbations, and in some cases the intermenstrual symptoms are so slight or indefinite that the true nature of the affection is not suspected until abdominal examination shows tenderness at McBurney's point and other evidences of chronic appendicitis.

10. **Functional Pelvic Congestion.**—Chronic functional congestion of the pelvis, due to constant standing, long walking or other causes, may cause very troublesome dysmenorrhea.

11. **Reflex Dysmenorrhea.**—There are occasional cases of dysmenorrhea apparently due to reflex disturbance from a distant part of the body. One of the most striking of such reflex connections is that from within the nose. In certain cases, dysmenorrhea has apparently been due to some pathologic intranasal condition and has been relieved by treatment of the same. These are sometimes referred to as cases of "nasal dysmenorrhea." In certain other cases, menstrual pain has been relieved by cocainization of particular

areas of the normal nasal mucosa. This fact was first brought to the attention of the profession by Fliess, a German rhinologist, who in 1897 presented to the Berlin Obstetric Society a paper detailing his experiments in that direction. He found that in some cases of dysmenorrhea the pain disappeared within a few minutes after the application of a 20 per cent cocaine solution to certain areas in the nose. These areas were the anterior end of the inferior turbinated bone of each side, and a spot just opposite this on the septum, sometimes referred to as the tuberculum of the septum.

Fliess in his experiments divided the cases of dysmenorrhea which he encountered into two classes—first, those in which the pain ceased as soon as the menstrual flow began, and, second, those in which the pain continued along with the flow. In the first class he noticed no particular effect from the intranasal cocaine application. In the second class, those in which the pain continued during the flow, the effect of the application of cocaine to the areas mentioned was striking. Usually within five to seven minutes after the application the pain ceased and did not reappear during that menstruation. In some cases there was a pathologic condition involving the areas mentioned, but the same result was obtained in many cases in which no disease was apparent. To eliminate "suggestion" as a factor in the case, the application of cocaine was made to other intranasal areas, instead of to those mentioned, and there was no result. Again, the designated areas, which are sometimes referred to as the "genital spots," were touched with an inert solution and there was no result. Again, in those cases in which temporary relief followed the application of cocaine to the intranasal genital spots, cauterization of those areas produced a cure, either permanent or lasting several months.

Good results have since been obtained by other reliable observers in various parts of the world and this measure has been established as useful in the treatment of certain cases of dysmenorrhea. It has also served to call attention to the fact that certain pathologic conditions in the nose may give rise to troublesome dysmenorrhea, and hence in a case of dysmenorrhea that persists without apparent cause a careful rhinologic examination should be made to exclude nasal trouble or to discover and remove it.

12. **Neurasthenia.**—The neurasthenic individual is prone to pains in the pelvis, as in other parts of the body, and, of course, they are likely to be most severe at the menstrual time. These pelvic pains occur without any apparent local cause. The cases usually present the characteristic of "neuralgic dysmenorrhea." Such patients are often subjected to ineffectual treatment for many months—until the practitioner grasps the fact that he is dealing, not with a local condition, but with a widespread affection of the nervous system.

13. **Hysteria.**—In patients with hysteria the disturbances may be much increased at the menstrual time. In some cases the hysteric manifestations between the periods are so slight that hysteria is not suspected until a careful examination is made.

Treatment of Dysmenorrhea in the Virgin

In a case of dysmenorrhea in a virgin a local examination is not called for at first, unless the patient has taken a course of treatment without decided benefit or there are symptoms indicating some decided local lesion. If there are no symptoms between the menses, indicating some gross lesion, it is to be assumed that the menstrual pain is due to that most frequent cause—defective nutrition with uterine hyperesthesia, anteflexion of cervix and more or less stenosis of the cervical canal. This condition may, for convenience, be designated as "neurotrophic" or endocrine dysmenorrhea. The management of the cases may be conveniently divided into two parts—(A) treatment during the menstrual flow and (B) treatment between the periods.

(A) Treatment During the Flow

Suppose you are called to see the patient while she is menstruating and in much pain. The first thing to do is to relieve her immediate suffering.

1. **General Measures.**—Put the patient to bed and have hot stupes applied to the lower abdomen, and the bowels freely opened by an enema or a purgative or by both. In some cases you will find that the patient has already carried out this part of the program and has also taken hot drinks of various kinds, having found by experience that these measures diminish the pain.

2. **Sedatives Internally.**—For further relief, if the pain is troublesome in spite of the above measures, give some sedative. The time-honored viburnum prunifolium will often give considerable relief. It may be given either as the plain fluid extract or in the form of one of the less nauseating and more effective preparations supplied by reliable manufacturing drug houses—for example, Liquor Sedans (P. D. & Co.), which contains 4 gr. of viburnum, 8 gr. of hydrastis, 4 gr. of Jamaica dogwood and 5 gr. of cascara to each teaspoonful. If the pain is severe, this is not sufficient for immediate relief. For the severe pain prescribe phenacetin and codeine. There are a number of other preparations that are sometimes used with benefit, among them camphor, fluid extract of cimicifuga and aromatic spirits of ammonia. In those cases in which nervousness is a prominent feature, give sodium bromide in 10 gr. to 20 gr. doses every three hours until the general nervous irritability subsides.

Morphine is rarely necessary. When the pain cannot be otherwise relieved, morphine may be given for temporary relief, but it should be given in such a way that the patient does not know what she is taking. The above measures usually give the patient relief, but she should stay in bed as long as there is any tendency of the pain to be severe.

3. **Intranasal Applications.**—This may be tried in those cases in which the pain persists after the flow is well established. Schiff found this treatment effective in 35 out of 41 cases in which it was tried. Ephraim reported 18 successes in 24 cases, and Linder 10 successes in 16 cases. It has proved successful in some cases that persisted in spite of dilatation and curettage and various kinds of internal medication. On the other hand, it has failed com-

pletely in cases that apparently should have been relieved by it. It is uncertain, but is worthy of trial in selected cases. When using this treatment remember the following points:

a. The application is made in each nostril, to the region including the anterior end of the inferior turbinated bone and the adjacent portion of the septum.

b. The strength of the cocaine solution usually used is 20 per cent though possibly a weaker solution (e.g., 10 per cent) would do.

c. The application should be made by the physician only, and the patient should not, as a rule, know what is being applied. The solution should not be given to the patient for use at home, as it might lead to the formation of the cocaine habit.

d. In those cases in which the cocaine application stops the pain, the "genital areas" in the nose should be cauterized by a rhinologist, that the reflex feature of the dysmenorrhea may be cured or relieved for some months.

(B) Treatment Between the Menstrual Periods

After the pain is relieved for that menstrual period, then comes the question of treatment in the interval, to prevent or diminish the pain of succeeding periods.

In the virgin a local examination is not called for at first, in the absence of decided local symptoms between the menstrual periods. The first thing to do is to put the patient on a regimen of general measures and internal treatment that will put her in first-class general health.

1. **General Measures.**—The general measures are directed toward improving the general muscular tone, correcting anemia and overcoming constipation. They have been given in detail when speaking of the treatment of amenorrhea.

2. **Internal Treatment.**—Endocrine treatment is important in these nutritional cases of dysfunction. Corpus luteum has been used with much benefit in some cases. In other cases thyroid feeding gives more relief. For details of endocrine treatment see Chapter XV. The patient should also as a rule be placed on some good iron **tonic,** with or without the addition of arsenic or strychnine or quinine, as thought best. She is to be given also such other medicines as are indicated by special symptoms present, i.e., by indigestion or cough, or sleeplessness or neuralgias. Remember that in gouty or rheumatic patients, dysmenorrhea is sometimes much relieved by remedies directed towards overcoming the nutritional disorder manifested by the gout or rheumatism. **Laxatives** also are important when there is any tendency to constipation. Give some tonic laxative in sufficient doses to give one or two good bowel movements daily.

Antispasmodics have a particular effect in overcoming menstrual pain in some cases. Painful contractions of the uterine wall seem to be the important feature in certain patients, and in such cases atropine, administered to the physiological effect for a day or two before menstruation gives prompt relief. Decided benefit is often secured by the viburnum preparations previously mentioned, given in moderate doses, three times daily continuously and increased to every four or six hours during the flow. If there is excessive flow, ergotin with cannabis indica in capsules may be used. These are administered continuously for some months.

Many other preparations belonging to the general class of antispasmodics, and mentioned in works on materia medica and therapeutics, have been used from time to time for dysmenorrhea—with marked relief to some patients and with no relief to others. As a general proposition, those remedies which are beneficial in neuralgias are beneficial also in dysmenorrhea.

3. **Intranasal Examination.**—In cases where there are any nasal symptoms and also in the cases relieved by intranasal applications, rhinologic examination should be made. If some nasal disease is present, the removal of it may so improve the menstrual pain that the patient is saved much suffering and is spared the embarrassment of a pelvic examination.

4. **Pelvic Examination** to determine local lesion. If there is no decided benefit from the measures already mentioned after two or three menstrual periods, or at any time if severe local symptoms develop, the patient should be examined to determine if there is any local lesion. The details of the examination of a virgin have been given in Chapter I. In many cases it is best to make the examination under anesthesia, for the reasons there stated. When examining a patient under anesthesia for dysmenorrhea or for menorrhagia, preparation should be made for dilatation and curettage, so those therapeutic measures could be at once carried out under the examination-anesthesia should the examination reveal a condition requiring it. Also, if a retrodisplacement is found, an attempt to correct it by manipulation may be made carefully while the patient is under the anesthetic.

The subsequent treatment will depend, of course, upon the conditions found on examination. If there is backward displacement of the uterus or uterine myoma or pelvic tuberculosis, treatment must be given accordingly. If the trouble is neurotrophic dysmenorrhea, that must receive the proper attention, and so down the list of possible conditions. The treatment for these various conditions will be found in the appropriate chapters.

The condition styled **neurotrophic dysmenorrhea** belongs especially to this chapter. The local measures of treatment for this condition are, in general, measures directed toward overcoming the stenosis and removing an unhealthy endometrium, with such nutritional change, as would necessarily follow this instrumentation. These measures will be mentioned as a continuation of the treatment of the dysmenorrhea in cases where no more marked local lesion is found.

5. **Thorough Dilatation and Curettage under Anesthesia.**—As previously explained, this should as a rule be the only local measure employed in the virgin, as it is not advisable to employ any local treatment unless it is of such character that it will have some decided effect. If the patient is to be anesthetized for examination, preparation should be made so that dilatation and curettage could be carried out at the same time if found advisable. The curettage is important, for it enhances the nutritive effect of the dilatation

—and the benefit from the procedure is due to its nutritive effect on the uterus and ovaries as well as to the removal of obstruction. The details of this operation have been given in Chapter VI.

If the patient is engaged to be married soon, the examination under anesthesia with the dilatation and curettage should not ordinarily be carried out. Wait until several months after marriage before employing any local measures. In the meantime pregnancy may take place, and that will do more toward a permanent cure of the trouble than the most radical operative measure. The marked effect of pregnancy in these cases of neurotrophic dysmenorrhea is an additional indication that it is largely a nutritional trouble. Pregnancy exercises a most profound influence upon the nutrition of the uterus and the ovaries. It has been argued that pregnancy and parturition produce the marked curative effect in these cases by overcoming the stenosis. Without doubt it does overcome the stenosis better than any other known measure, but, as has already been explained, the stenosis is only one feature of the trouble and the removal of the stenosis alone does not always effect a cure.

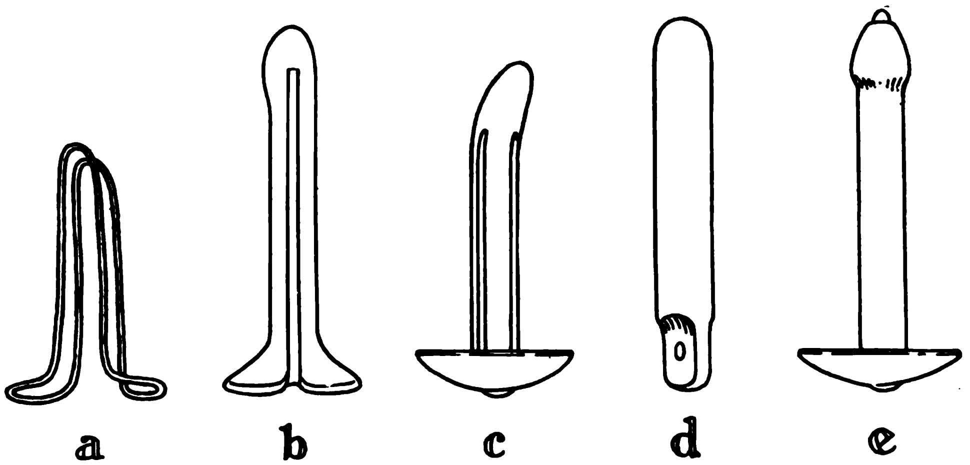


Fig. 921.—Different forms of stem pessary. Practically the only type that the author uses is the last (*e*). This has a shoulder far enough in to reach past the internal os, and has proved self-retaining in most cases. This avoids suturing the stem to the cervix, which is not advisable where it can be avoided.

We may confidently expect considerable relief from thorough dilatation and curettage in the great majority of the cases. The duration of the improvement is variable. In a majority of the cases there is a return of the trouble after periods varying from a few months to several years, though it usually does not become so severe as it formerly was. In 95 cases, reported by Kelly, 32 were relieved (19 completely and 14 largely), with no return of the trouble —the period of observation extending from one to twelve years; in 7 cases there was relief for a period varying from one to nine years, the dysmenorrhea finally returning; in 28 cases there was relief for a few months, but the dysmenorrhea returned within a year; and in the remaining 28 cases there was no relief.

After the dilatation and curettage it is well to introduce a uterine stem to maintain the opening over a period of one to several weeks. The stem should be long enough to go well past the internal os. The author prefers one with a definite shoulder that lies above the internal os (Fig. 921, f), thus making sutures unnecessary. The stem is left in as long as the patient is in the hospital, and often for several weeks afterward if the patient lives in town where she can be kept under observation and come to the office for removal of the stem. While the stem is in place the patient may be up and about the house as usual, but should take only moderate exercise particularly at the menstrual time. It is well to leave the stem in past at least one menstrual period. Discomfort should be reported at once, and any evidence of intrauterine irritation indicates immediate removal of the stem. For some time the author has been using the stem as a routine after dilatation in these cases of firm stenotic cervix, and so far no untoward effect has been observed.

The cases which are particularly amenable to dilatation are, of course, those in which the obstructive feature is prominent, i.e., the pain is severe and cramp-like, is most severe just as the flow is starting and largely disappears when the flow is well established. If there is a tendency later to return of the obstructive features of dysmenorrhea, office dilatation of the cervical canal may be helpful in some cases.

6. **Excision of Tissue from Internal Os.**—(Theilhaber Operation).—The cervix is dilated thoroughly, and curettage is carried out if desired. The cervix is then split laterally, on each side, to near the internal os. Then with a small knife, inserted under the direction of the finger-tip carried to the internal os, a small wedge of tissue is removed from the anterior and from the posterior portion of the constricting ring. This wedge of tissue extends about one-third through the thickness of the uterine wall. The work is much facilitated by a knife of special design. The preliminary incisions, splitting the cervix, are then closed by sutures.

This removal of wedges of tissue from the constricting ring at the internal os enlarges the opening and overcomes the obstruction. Series of cases have been reported with excellent results in nearly all cases as far as relieving the obstruction. The author employed the operation with satisfaction, but prefers the Dudley operation, which gives greater probability of permanently overcoming the obstruction. The small wedge-shaped grooves left by the excision of tissue in the Theilhaber operation are likely to fill up with scar-tissue and the opening again become small. There is nothing about it to insure permanent enlargement of the opening.

7. **Splitting Cervix and Sewing It Open.**— Dudley Operation—Fig. 922.) This is applicable to those cases of anteflexion of the cervix in which the severe menstrual pain persists after thorough dilatation and curettage under anesthesia. In some cases in which the cervical anteflexion is particularly marked, it is advisable to employ this as the primary operative procedure. The steps of the operation are as follows:

a. The cervix is dilated thoroughly and the uterus curetted in the usual way.

b. The posterior lip of the cervix is then split longitudinally up to the vaginal vault, the incision being carefully continued internally up to and past the internal os. The constricting ring about the internal os should be divided sufficiently to readily admit a finger. Care is necessary to avoid cutting too deeply into the uterine wall at this point, for, if the wall is cut through and the peritoneal cavity opened, there is danger of peritonitis. Ordinarily, there is no necessity for opening the peritoneal cavity. In some cases, however, the posterior peritoneal pouch comes very low or the inter-

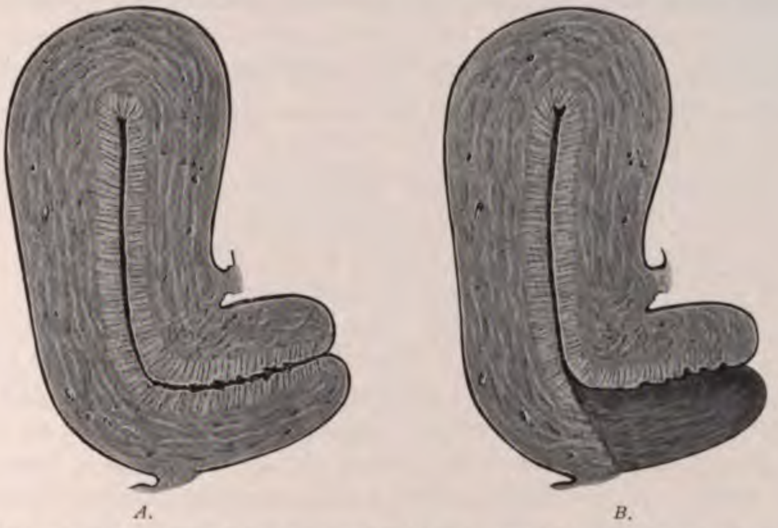


Fig. 922.—Splitting the cervix for dysmenorrhea (Dudley operation). *A.* Showing the sharp bending of the canal from the anteflexion of the cervix. *B.* Showing the unobstructed exit secured by splitting the posterior lip of the cervix and sewing it open.

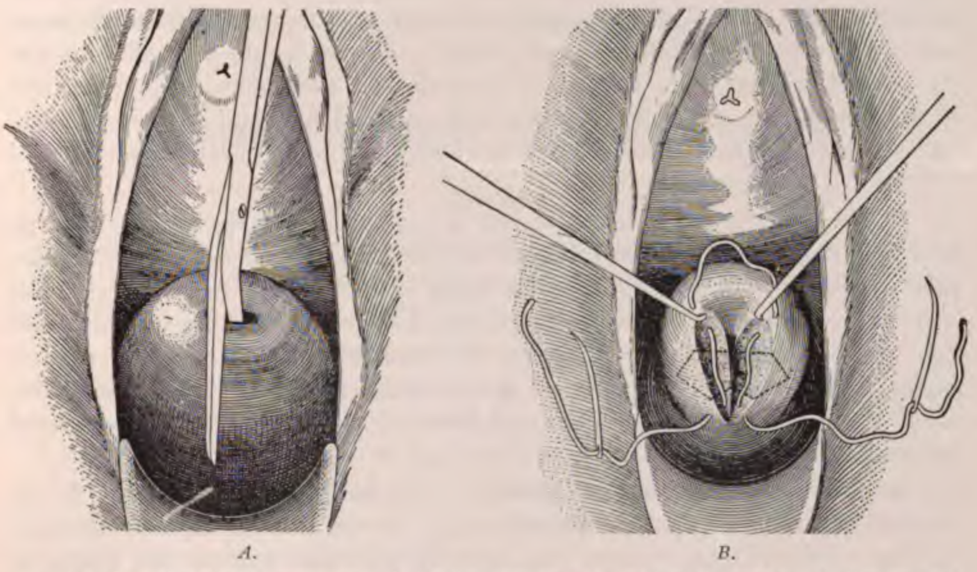


Fig. 923.—The Dudley operation. *A.* Dividing the posterior wall of the cervix. *B.* The posterior wall of cervix divided and the principal suture passed. Before passing this suture a wedge-shaped piece of tissue is excised from the cervix on each side of the wound, as indicated by the dotted lines. (Dudley—*Practice of Gynecology.*)

nal os is situated unusually high. In either case, it may be advisable to deliberately open the peritoneal culdesac in order to properly complete the operation. The division of the intravaginal portion of the cervix may be most conveniently made with long scissors (Fig. 923-A). The careful division of the ring about the internal os is made with a bistoury under the guidance of the finger.

c. A wedge of tissue is then cut out of each lip, as indicated by the dotted lines in Fig. 923-B, so that each of the two cut edges will fold well on itself when the principal suture is tied.

d. A strong silkworm-gut suture is then passed as shown in Fig. 923-B. This, when tied, folds the cut surface of each lip upon itself in such a way that the ends (where the tenacula are caught in Fig. 923-B are brought into the angle of the wound, and this tends to permanently hold apart the divided tissues about the internal os. Before this main suture is tied, however, secondary sutures of catgut should be passed in sufficient numbers to close the lateral portions of the wound and prevent any hemorrhage. The main suture is then tied, and lastly the secondary sutures. It is important to pass the sutures deeply enough to catch the bulk of the divided tissue to prevent subsequent oozing. In one of the author's cases persistent oozing followed the operation and this increased after several hours to a flow of blood, which firm vaginal packing failed to stop and which affected the patient's pulse, and assumed such serious proportions that he was called to the hospital in the middle of the night. He placed the patient in Sims' posture, removed all the packing and passed two or three strong catgut sutures deeply through the cervix in such a way as to effectually constrict all the tissue from which the bleeding might come. This was done without anesthesia and without disturbing the other sutures. This stopped the bleeding and the patient convalesced without further trouble.

e. In cases where the anterior lip of the cervix is very long it may be advisable to shorten it so as to allow the cervix to better assume its normal backward direction, instead of being again bent forward by pressure of the posterior vaginal wall. This is accomplished by excising the redundant portion of the anterior lip and closing the resulting raw surface by sutures passed transversely. This draws a good wedge of tissue into the angle between the cervix and corpus uteri and tends to push the cervix back toward its proper direction.

11. **Abdominal Incision of Uterus.**—This method (proposed by C. W. Barrett) consists of opening the abdomen by regular suprapubic incision, making a longitudinal incision through the posterior wall of the uterus at the internal os, spreading this incision laterally so that it extends transversely and then suturing it in this position. It accomplishes enlargement of the internal os and consequent relief of the obstruction. As a rule, however, the patient may be sufficiently relieved without subjecting her to the danger of abdominal section. When the abdomen must be opened on account of accompanying disease of the adnexa or persistent retrodisplacement of the

uterus, then this method of enlarging the internal os and correcting the forward flexion of the cervix may be considered.

12. **Operations for Diseased Adnexa.**—Of course, where there is tubal or ovarian or other form of periuterine disease, that should receive proper treatment, operative or otherwise. In many cases, painful menstruation is simply a symptom of some such pelvic disease, and is relieved by removal of the same. In membranous dysmenorrhea, also, search should be made for chronic ovarian or tubal disease.

The removal of practically normal ovaries or ovaries that are not seriously damaged, for the relief of dysmenorrhea, is to be most strongly condemned. There are many things that are far worse than some pain for a few days each month, and the removal of both ovaries in a young woman is one of them. Pain may be relieved temporarily by some of the various palliative measures already described, and then there is always the possibility that the pain will diminish or cease from the lapse of the time and the continual employment of therapeutic measures. But when the ovaries are once removed they are gone irrevocably, and in a certain proportion of such cases the last condition of such patient, mentally and physically, is worse than death itself. Not that the removal of the functionating ovaries in a young woman necessarily or always has such a marked mental and physical effect, but in certain cases it has, and we can never be certain that such will not be the result in the particular case under consideration. Of course, it is possible that there may be certain rare cases in which, in spite of every other measure, the patient's suffering from menstruation is such as to justify this risk, but the author has never met such a case.

(B) DYSMENORRHEA IN THE MARRIED WOMAN

Causes

Dysmenorrhea in the married woman may be due to any of the thirteen conditions described as causes of dysmenorrhea in the virgin. It may be due also to one of the following additional conditions:

14. **Infected Endometritis,** acute or chronic.

15. **Salpingitis** (acute or chronic) or one of the other forms of pelvic inflammation (oophoritis, pelvic cellulitis, pelvic peritonitis).

Judd reported 217 cases of endometritis, accompanied with more or less laceration of cervix and pelvic floor, of which 108 suffered menstrual pain and 109 did not. He reports also 177 with diseased tubes and ovaries, of which 107 had menstrual pain and 70 did not.

In married women membranous dysmenorrhea must be distinguished from early abortion and extrauterine pregnancy, in both of which conditions there may be bloody discharge, with much pain and the passage of shreds of membrane. If this happens to take place near the menstrual time, the patient naturally supposes it is simply a menstruation somewhat delayed. In membranous dysmenorrhea there is usually a history of the expulsion of membrane at several menstrual periods, whereas with abortion there is the history of a missed menstruation and of morning sickness. Also the blood clots are much more numerous in abortion, and with the membrane can usually be found a small sac and embryo. The bleeding from abortion persists indefinitely until the uterus is emptied, whereas in membranous dysmenorrhea it lasts only about the usual menstrual time. Microscopic examination of an expelled membrane or of shreds removed by curettage in abortion shows chorionic villi. In extrauterine pregnancy there is no previous history of membranous dysmenorrhea and the patient, previously regular, has now gone over time for one or more weeks. The pain is due to intraperitoneal bleeding and presents the characteristics of the same.

Nutritional disturbances of the uterus and ovary are found in the parous, or in the nonparous, and general tonic and endocrine therapy may be indicated accordingly.

Treatment

The treatment during the flow is the same as already detailed for the virgin. The treatment in the interval is determined by the cause of the trouble found in the examination.

INTERMENSTRUAL PAIN

The interesting subject of pain occurring at a certain time every month in the intermenstrual period has received considerable attention from investigators, and the conclusion has been reached that it is not an indication of any particular lesion. Malcolm Storer, who reported 20 cases of his own and 25 additional cases collected from literature, found that in 10 of the cases there was a marked increase in the leucorrhea at that time, indicating congestion of the uterus. In his 45 cases reported by Storer the pain appeared with regularity in all cases, practically every month unless pregnancy was present. In 22 cases it appeared always at the same time (in most cases about two weeks) after the beginning of last menstrual flow. In 13 cases there was a variation of two days, in four cases there was a variation of four days, and in two cases of irregular menstruation it would appear on a certain day before the menstruation. In 37 out of 41 cases the pain appeared from twelve to sixteen days after the beginning of the last menstruation and in 20 of them it began exactly on the fourteenth day. In 2 cases it came from the seventh to the tenth days, in 1 case on the seventeenth day and in 2 cases on the eighteenth day. Observations like these well support the view now generally held that this periodically returning pain, often alternating in the right and left side from month to month, is actually caused by the enlarged graafian follicle at the time of ovulation. The investigations of Fraenkel and others show that approximately midway between menstruations the follicle ruptures and the corpus luteum forms. It seems plausible that under certain conditions this process might be associated with pain.

Treatment should proceed on the same general lines as the treatment laid down for menstrual pain, i.e., the correction of general conditions first, and the employment of local measures, especially of operative measures, only in cases where there are well-defined indications and after other measures fail. As Coe has pointed out, the assumption that intermenstrual pain is always associated with cystic ovaries, and is therefore an indication for operation, is not tenable. Cystic disease of one or both ovaries is found in some cases, but the diagnosis of cystic ovaries or an operation for the same must always be based on distinct examination findings and not simply on periodic pain. Endocrine treatment may be helpful.

IRREGULAR MENSTRUATION

The menstrual flow may come too soon, the interval being only ten days or two weeks. Again the flow may not come soon enough, running overtime from one to two weeks. It is sometimes difficult to determine positively whether the irregular flow complained of is really menstruation or simply a bloody discharge from some disease of the vagina or uterus. Unless the bleeding resembles closely the menstrual flow in character and onset and duration, it should be regarded as a pathologic discharge, and an examination should be made to determine its cause, that proper treatment may be instituted.

PRECOCIOUS MENSTRUATION

Precocious menstruation is the appearance of menstruation at an early age. For genuine menstruation to take place, there must be considerable development of the genital organs, and this very rarely occurs before the age of ten. Rare cases have been recorded in all ages, even in infancy. It has been known to begin in infancy and continue regularly. There is usually precocious development of the breasts and of the external genitals, also, due to endocrine disturbance (see Chapter XV).

Great care is necessary, however, in establishing the fact of precocious menstruation in a given case. Every stain of blood does not mean menstruation. The blood may come from some inflamed or irritated area or ulcer, or growth on the vulva or in the vagina, uterus, rectum or bladder. In infants a slight bloody uterine discharge occurs not infrequently within the first week or two after birth. It is not a menstrual flow and it soon disappears. Again, a red stain on the diaper, which the mother supposes to be blood, is often made by urates from a concentrated urine.

VICARIOUS MENSTRUATION

Vicarious menstruation is the discharge of blood from other parts of the body at the menstrual time. The uterine discharge may or may not be wholly or partially suppressed. The bleeding usually takes place from the nose or from some open sore, though it may come from almost any mucous surface, such as the lungs or stomach, or bladder or rectum. Much more rarely some area of the cutaneous surface is affected, the axilla and the groin being the most frequent. At the affected site there appears an ecchymosis and later a distinct flow of bloody serum. The vicarious flow is likely to be irregular, appearing only at some menstrual periods. Allied closely to this is the monthly discharge of milk from the breasts sometimes observed.

Vicarious menstruation in any form is rare. Goffe records a very interesting case in which the vicarious discharge came alternately from the nose and the axilla, and seemed to be associated with periods of ungratified sexual desire. Vicarious menstruation is found principally in nervous women in whom there is imperfect development of the uterus or imperfect performance of its functions. The treatment consists in the correction of any pelvic disease present and endocrine treatment to regulate ovarian function.

DYSPAREUNIA

The two principal disturbances of sexual intercourse are dyspareunia (difficulty in coitus) and sexual impotence (absence of sexual orgasm in coitus).

Difficulty in coitus (dyspareunia) varies from a slight discomfort, hardly noticeable, to pain so severe as to make coitus unbearable.

Causes

The more common causes of dyspareunia are as follows:

1. **Some Obstruction to Normal Coitus.**—*A. Imperforate Hymen.*—In such a case there would be present the history of amenorrhea and also the disturbances that come from retained menstrual blood. You may think there would be a history of no coitus, and such is usually the case, but in some cases coitus has taken place through some adjacent opening—for example, through a dilated urethra.

B. Organic Stenosis of Vaginal Orifice.—The opening is large enough to permit the regular escape of menstrual blood, but it is not large enough to permit coitus. The obstructing tissue is so firm that it does not rupture as ordinarily on attempted coitus. This obstruction may be due to a very strong, firm hymen, or to some distinct malformation, such as a vaginal septum from double vagina. Usually with double vagina, each vagina is large enough for coitus or the septum is placed so far to one side that it does not interfere. But it may be so placed as to interfere decidedly with coitus and to require division. Again, an organic stenosis here may be due to scar-tissue from severe burn or other injury, or from laceration in labor, with extensive scar-tissue formation, or from vaginitis in childbirth (see Chapter IV).

C. Spasmodic Stenosis at Vaginal Orifice.—In some cases there is marked hyperesthesia about the vaginal orifice, and every attempt at coitus causes unbearable pain or causes spasmodic contraction of adjacent muscles to such an extent that coitus is impossible. This marked hyperesthesia may be due to inflammation, such as vulvitis or vaginitis, or it may be due to sensitive abrasions about the vaginal entrance. In other cases it is due to that peculiar condition known as "vaginismus," a reflex contraction of the levator ani and adjacent muscles without apparent cause. In exceptional cases this is so severe and persistent as to prevent coitus altogether.

D. Severe Pain on Attempted Intercourse.—There is no stenosis or spasm, but just pain, so severe that coitus is impossible. This may be due to inflammation about the external genitals or inflammation within the pelvis.

2. **Simple Inflamed Abrasions about the Vulva** is not an infrequent cause of much suffering immediately after marriage. The small abrasions that naturally accompany rupture of the hymen at the first intercourse may become inflamed after a day or two, making subsequent coitus painful. This sometimes causes much alarm to the patient and her husband, who fear some serious trouble. The treatment is abstinence from coitus for a few days, with the frequent use of some mild antiseptic wash, followed by drying with absorbent cotton and the use of a soothing ointment, such as carbolized vaseline. It is well to keep the parts covered with a pad of absorbent cotton, to keep the clothing from contract with the painful areas and also to protect the abrasions from infection.

3. **Venereal Sores** (chancroid, syphilitic).—These ulcers also may be found soon after marriage or at any other time. Care should always be taken not to give a positive prognosis in a case of abrasion or sore which has not yet had time to develop its characteristics.

4. **Gonorrheal Inflammation** is an altogether too common cause of painful coitus in the first few weeks following marriage. The pain may be due to the vulvar inflammation, or to the urethritis or to the vaginitis, or to painful abrasions or to the inflammation of the vulvovaginal gland of one or both sides.

5. **Other Forms of Inflammation** of vulva or vagina, or vulvovaginal glands.

6. **Inflammation of Uterus** (acute or subacute).

7. **Inflammatory Lesions around the Uterus,** in which pain is caused by the impact of the male organ or by the sexual congestion. When the ovary is prolapsed into the culdesac and bound there by adhesions, sexual intercourse may cause much pain. The author recalls one patient in whom it was finally necessary to open the abdomen, break up the adhesions and fasten up the prolapsed ovary in order to relieve the suffering in coitus. In the more serious pelvic inflammatory conditions, dyspareunia is frequently a prominent symptom.

8. **Retrodisplacement of the Uterus,** with inflammation. It is surprising how much displacement of the uterus, with forward projection of the cervix and apparent blocking of the vagina, can take place without occasioning any particular disturbance in coitus. But if inflammation appears, then dyspareunia is often marked—much more so than from the same amount of inflammation without displacement.

9. **Bladder or Rectal Diseases** occasionally cause painful coitus, particularly inflammatory diseases.

Treatment

The treatment of dyspareunia is indicated by the **particular condition present,** as determined by a careful examination.

1. If there is some **malformation** about the vaginal orifice (imperforate hymen, thick hymen, septum in vagina, organic stenosis of vagina), the obstruction must be removed by the necessary operative measures.

2. If coitus is interfered with by **tender areas** about the vaginal entrance, or by ulcers or by hyperesthesia, the following measures may be employed:

a. Abstinence from sexual intercourse for one to three weeks.
b. Hot vaginal douches once or twice daily—medicated or unmedicated, depending upon the presence of discharge.
c. Laxatives as needed. Chronic constipation increases the congestion and irritability of the structures.

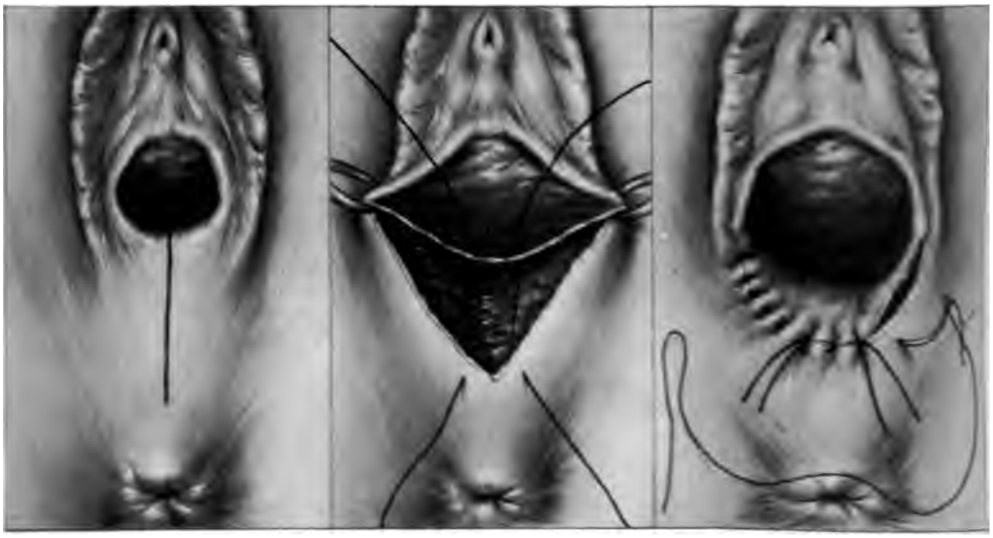


Fig. [illegible]—Operation for stenosis of the vaginal [illegible] functional vaginismus or organic. A. [illegible] B. [illegible] The [illegible] been [illegible] sutures are [illegible] C. The [illegible] together [illegible] nearly completed.

d. Some sedative ointment—for example, chloretone ointment (10 per cent.), applied two or three times daily.
e. Bromides, if there is much nervous irritability or apparent hyperesthesia or reflex centers.
f. When intercourse is again attempted, the patient should coat all the sensitive surfaces with a sedative ointment. The chloretone ointment above mentioned may be used or simply plain vaseline.

3. If the vaginal opening is too small or there is the spasmodic condition known as **vaginismus,** stretching of the opening is to be employed in addition to the other measures just detailed. In some cases the tendency to spasm may be overcome by gradual stretching with a speculum every few days.

In cases of organic narrowing or a serious grade of vaginismus that does not yield to minor measures, it is advisable to operate under anesthesia. The operation consists in incising the perineum and pelvic floor, so as to enlarge the opening and then undermining the flaps and suturing them over so as to cover the divided surfaces. The steps are shown in Fig. 924.

The treatment of the **other organic lesions** mentioned is taken up in detail in the appropriate chapters.

SEXUAL IMPOTENCE

The absence of strong sexual feeling in the woman during coitus does not assume the serious aspect it does in the man, with whom erection is necessary to insemination leading to pregnancy. The strong sexual feeling, with its consequent orgasm, in the woman is not at all necessary to impregnation, though it increases the probability of impregnation. From the history of cases of sexual disturbance it is evident that many otherwise normal women have little or no sexual feeling until some months or years after marriage—sometimes not until after one or more children are born. The response to sexual excitement apparently grows with the proper exercise of the sexual functions. This fact is important and may be used to prevent discord and disruption in families where either the husband or the wife is becoming dissatisfied and despondent because it is felt that there is not the proper sexual response.

Again, there are cases in which the wife is not in physical condition to respond. She has some chronic trouble which so saps her strength that she has not the vitality for this function. This loss of strength may be due either to some general condition or to some local condition, or to both. It is hardly necessary to name the various conditions. They comprise the whole list of debilitating conditions, both general and local.

The **treatment** of sexual impotence is directed toward removing any local disease, and toward building up the general health to the highest point—by a long course of tonics (including iron, strychnia, etc.), by change of environment, and by rest from care and worry and overwork, and too frequent sexual intercourse. The rest indicated is very important, for the things mentioned tend to keep the patient dragged down below par and in no condition to respond buoyantly and vigorously to any of the mental or physical requirements of daily life. Corpus luteum is very helpful in these cases.

STERILITY

Sterility is the absence of pregnancy under circumstances that normally lead to pregnancy.

It is said that about 10 per cent of marriages are without offspring, and the popular impression is that this sterility is nearly always due to some defect or disorder in the genital organs of the woman. The woman receives almost altogether the blame for the inability to produce offspring. In many cases the defect is with the woman, but in many other cases this blame is placed upon her unjustly. If we exclude from the definition of sterility those cases in which the failure to produce offspring is due to early abortions, or to prevention of conception, then sterility is in a large proportion of the cases, if not in the majority of them, due primarily to the husband. In that large class of cases in which the immediate cause of the sterility is gonorrheal inflammation involving the tubes and ovaries, the primary cause lies with the husband and on him must rest the blame for the childless home.

Sterility is sometimes defined as the inability to bring forth a living child, even if the child actually is carried to full time. But it seems preferable to limit the term to the cases of absence of pregnancy. This is sometimes designated as "absolute sterility." Therefore, considering sterility from the gynecologic standpoint, let the definition be "the inability to become pregnant." The patient may have had children or abortions in former years, or she may not. At any rate, she does not become pregnant now, though she earnestly desires to be so.

Causes

In order to assist in determining the exact cause of the sterility in the various cases, it is well to consider what is necessary that a normal pregnancy may take place. It is necessary ordinarily (a) that healthy spermatozoa be deposited in the vagina, (b) that the spermatozoa remain healthy and penetrate into the uterine cavity and into the fallopian tubes, (c) that a healthy ovum be formed in the ovary, (d) that it find its way into the fallopian tube, where it can be fertilized by a spermatozoon, (e) that the fertilized ovum pass into the uterus, and (f) that it find there an endometrium suitable for its implantation and development.

Some of these conditions are not always absolutely necessary. At least five cases of conception, with labor at term, have taken place in patients where both fallopian tubes and presumably both the ovaries were removed. Of course, some ovarian tissue was left. But the tubes may be removed and still the openings in some cases, without doubt, reopen and permit the ovum to pass. Fritsch ligated both fallopian tubes in the middle with silk and still pregnancy followed three years later. Ashton reported the occurrence of pregnancy in the cervix following the removal of the body of the uterus for fibromyomata, showing that even the body of the uterus was not absolutely essential to pregnancy. Again, pregnancy has occurred in cases where penetration of the male organ into the vagina was impossible, showing that the spermatozoa may pass from the external genitals up to the uterus. But these are all very exceptional cases. Ordinarily each of the conditions mentioned is a bar to pregnancy.

Assuming that the husband furnishes healthy spermatozoa, the sterility may be due to the following causes:

1. **Some Conditions Interfering with Coitus** are considered under "dyspareunia."

2. **Laceration of Pelvic Floor.**—When there has been a marked laceration, the vagina may be so relaxed and patulous that the semen is not retained

in contact with the cervix long enough for the spermatozoa to pass up into the uterine cavity.

3. **Vaginitis, or Profuse Discharge in the Vagina** may interfere chemically with the vitality of the spermatozoa or mechanically with their progress to, or entrance into, the cervix uteri. In either case the chance of pregnancy is diminished.

4. **Some Obstruction in the Cervical Canal.**—a. Stenosis of external os may be found in the form of the congenital "pin-hole" os or it may be due to scar-tissue resulting from former injuries.

b. Stenosis at internal os may be due to scar-tissue, but it is more frequently due to a sharp anteflexion of the cervix. It is often combined with a long pointed cervix and the "pin-hole" os already mentioned. This combination is a frequent cause of sterility in women who have never been pregnant, and it is usually accompanied with dysmenorrhea.

c. Discharge. There may be in the cervical canal an excessive secretion or discharge which interferes mechanically with their journey upward. It has also been shown lately that acidity of the normally alkaline uterine mucus quickly destroys the spermatozoa and thus may be the cause of sterility.

5. **Some Displacement of the Uterus.**—a. Retrodisplacement. Retrodisplacement of the uterus may throw the cervix so far forward that the spermatozoa do not readily enter it.

b. Anteflexion. Sharp anteflexion of the cervix may also throw the cervical opening too far forward.

c. Decided Prolapse. Prolapse of the uterus may interfere mechanically with coitus or with the passage of the spermatozoa to the interior of the uterus.

6. **Some Abnormal Condition Within the Uterine Cavity,** which interferes with the passage of the spermatozoa to the tubes, or which fails to furnish a proper place for the implantation and nourishment of the fertilized ovum.

a. Hyperplasia of Endometrium.
b. Infected Endometritis.
c. Tuberculosis of the Endometrium.
d. Malignant disease (Carcinoma or Sarcoma).
e. Fibromyoma.

7. **Some Affection of the Fallopian Tubes** which interferes with the entrance of the spermatozoa into the tube or with the entrance of the ovum into the tube, or with the passage of the fertilized ovum from the tube into the uterus.

a. Inflammation. Inflammation of the tube is the most frequent cause of sterility from tubal disturbance. This may be very slight—not enough to produce symptoms or physical signs, but just enough to cause occlusion of one or both ends of the tube. It may vary all the way from this mild form to severe inflammation and disorganization of the tube, with extensive exudate and adhesions and abscess formation. Salpingitis, coming on after the first childbirth, or miscarriage, because of inflammation during the puerperium or because of gonorrheal infection brought by the husband, who was untrue to his wife during her confinement, is a prolific source of the so-called "one child sterility."

b. Tuberculosis. Tuberculosis of tubes and adjacent structures.

c. Tumor. A tumor of the tube or in the vicinity of the tubes, interfering with their functions.

d. Malformation of the Tubes. This may consist in atresia of one or both ends of the tubes, or in blind passages and diverticula into which the ovum may wander and lodge. Or there may be abnormal openings in the wall of the tube through which the ovum may pass out into the peritoneal cavity and be lost.

8. **Some Affection of the Ovaries** that interferes with their function to such an extent that healthy ova are not formed or are not discharged in such a way that they pass into the fallopian tubes.

a. Inflammation.—Inflammation of the ovary may be present in some of its various forms—infected oophoritis, simple oophoritis, cystic ovary, cirrhotic ovary or an ovary with exudate and adhesions.

b. Tuberculosis of ovaries and vicinity.

c. Tumors of the ovary.

d. Displacement of the ovary may be so marked that the ova, instead of passing into a fallopian tube, where they would be fertilized, pass into the peritoneal cavity and perish.

9. **Certain Operations**—for example, removal of the uterus or of the fallopian tubes, or both ovaries.

10. **Douches**, which may interfere chemically or mechanically with the process of impregnation.

11. **General Conditions.**—The general health may be so poor that all the organs of the body are in too poor a condition to properly functionate, the genital organs among them. This is seen in some cases of marked anemia and emaciation, and general depression. On the other hand, it is present at times in patients who are inclined to stoutness. The effect of obesity in diminishing menstruation has been mentioned, and it sometimes has much the same effect on the capacity for impregnation. It has happened that sterility came on when a patient accumulated fat and disappeared promptly on reduction to her usual weight. That an insufficient diet may have an influence towards sterility is shown experimentally by Reynalds and Macomber (Jour. Am. Med. Assn., July 16, 1921).

12. **Endocrine Disturbances** have a marked influence on the function of the ovaries and the uterus, and hence must be considered in all cases of persistent sterility.

Diagnosis

A couple come to consult you because they have no children. Your problem is to find the cause of the sterility in this particular case. If the husband is an intelligent man, he will speak of any genital disturbance which he has had that might have a bearing on the subject. If no explanation is made, it is to be assumed that the husband is healthy, though this assumption should be confirmed as soon as opportunity occurs of questioning him when the wife is not present. Gross found the male directly at fault in about 16 per cent of the cases of sterility and De Sinty found the trouble to lie with the male in 25 per cent of the cases. The chief causes in the male were impotence, or absence of semen or absence of living spermatozoa. As soon as practicable the husband should be submitted to a thorough genital examination.

Assuming that the husband is healthy, the wife is questioned to secure the systematic gynecologic history and to bring out any special facts that may have a bearing on the sterility. The history may point decidedly to some serious pelvic disorders, or there may be nothing in the history to indicate that the pelvic organs are other than normal. A thorough pelvic examination is then made to determine whether there is any pathologic condition in the genital tract.

The various conditions that may give rise to sterility, together with their diagnostic points, have just been detailed under "causes."

Those cases in which the fallopian tubes are sealed may be determined by gas inflation of the uterus and x-ray examination to determine whether or not any gas has passed into the peritoneal cavity. This very helpful procedure, together with indications and contraindications and results, is explained in detail under Examination Methods (Chapter I).

Treatment

The treatment of sterility necessitates a careful survey of the patient's general health and the treatment of any disturbance found. The general nutrition must be built up by diet, exercise, regular hours of sleep, and tonics as needed. Obesity with the disturbed metabolism that goes with it must be overcome. Endocrine disturbances must receive appropriate treatment. Though there be no evident endocrine disturbance it is advisable to give corpus luteum freely, while carrying out the various local measures mentioned below.

Having given due consideration to general measures local measures may be employed as follows:

1. If there is **difficulty in coitus**, treatment for that will be required. This is considered in detail under dyspareunia.

2. There may be **anteflexion of the cervix**, with stenosis in the canal, a frequent cause of sterility in patients who have never been pregnant. Where sterility results from this condition, the treatment is dilatation of the canal, and for this there are three methods, as follows:

a. Partial Dilatation Without Anesthesia.—This dilatation is carried out in the office the same as for dysmenorrhea, except that the dilatation is made immediately after each menstrual flow instead of before the flow. Just after menstruation is supposed to be the most favorable time for impregnation, so the canal is dilated then and it remains somewhat dilated for a week or so. The patient is directed to take no douches unless there is a troublesome discharge. If there is a discharge necessitating douches, an alkaline douche (tablespoonful of sodium bicarbonate to two quarts of warm water) should be used and the douche should be taken in the evening—not in the morning. No antiseptic douche is allowed because it interferes with impregnation. This treatment may be repeated after each menstrual flow for some months, until pregnancy takes place or until it is apparent that no result is to be accomplished by this method.

In some cases the simple dilatation just described carried out a few times will put the parts in such condition that pregnancy ensues, and it is worthy of trial in all cases where the canal dilates readily and there is not a profuse uterine discharge. In one of the author's patients, pregnancy followed a single such treatment made after several years of sterility.

In many cases the more radical measures mentioned below are found necessary. However, before these are carried out for sterility alone, ordinarily the husband should have had his examination and the wife her test for patency of the tubes.

b. Thorough Dilatation Under Anesthesia.—The patient is anesthetized, the cervix widely dilated and the interior of the uterus curetted. The curettage is advisable in practically all such cases, for the endometrium is often not entirely healthy.

This thorough dilatation under anesthesia is employed in cases in which the previous method fails to produce results. It is advisable as the primary treatment in those cases where the cervix is small and sensitive. The dilatation thus secured is likely to persist in a measure over several months, and thus gives a good chance of pregnancy.

c. The Dudley Operation.—This is explained and illustrated under Dysmenorrhea. It is employed for the purpose of permanently overcoming the obstruction in cases where the stenosis tends to recur after wide dilatation under anesthesia.

3. There may be **inflammation of the cervix**, with discharge, which interferes with the vitality or upward progress of the spermatozoa. Such a condition requires the treatment for endocervicitis, see Chapter VI.

4. **Laceration of the Cervix**, with consequent cystic degeneration and discharge, may be present and requires the usual measures to allay the inflammation and lessen the discharge. If these palliative measures are not effective, the cervix should be put in better condition by an operation for repair—being careful in the denudation to leave a wide cervical canal, so that there will be no resulting stenosis. This removes the chronically inflamed and discharging surfaces, and thus increases the chance of the spermatozoa being able to penetrate into the uterus.

5. If there is marked **chronic endometritis**, that must receive appropriate treatment—which will include usually a thorough curettage.

6. **Retrodisplacement** of the uterus may be present. If so, it may require the treatment detailed in Chapter VII.

7. **Tumors** in the uterus, or elsewhere in the pelvis, must be removed when it is at all probable that they are a factor in the sterility.

8. **Pelvic Inflammation** in one of its various forms may be found. If the inflammation is of recent origin and there are no serious symptoms, employ

palliative measures. If the pelvic inflammation is improved thereby, these palliative measures may be kept up for several months in the hope that nature will repair the damaged organs sufficiently to restore their function. For the prognosis in regard to pregnancy after pelvic inflammation see Chapter X.

In chronic pelvic inflammation the chance of pregnancy may in some cases be decidedly increased by the removal of the disorganized portions of the fallopian tubes and special treatment of the remaining part. The special treatment consists of splitting open the distal end of the stump of the tube for some little distance and sewing it open, and then establishing the patency of the tube, if practicable, from the distal end to the uterine cavity.

9. If the patient has been taking **douches** for the treatment of any disorder or as a routine measure, stop them. In cases where a douche is really necessary, direct the patient to employ the saline douche. It may be taken before coitus, but not soon afterward.

LEUCORRHEA

There is normally a slight mucoepithelial discharge about the genitals, sufficient to keep the parts properly moist. Abnormal discharge may be only an increase in the normal mucoepithelial discharge, or the discharge may be mucopurulent in character, or watery or bloody. For convenience the various kinds of discharge may be grouped under the two terms, leucorrhea and bloody discharge. These disturbances are not diseases, but, like the other disturbances of function, are only symptoms.

Under the term "leucorrhea" are included all varieties of pathologic discharge from the genitals, except discharge containing blood.

Causes and Diagnosis

Leucorrhea due to extragenital disturbances only and without local change is hardly probable, for the leucorrhea is in itself evidence of some local departure from the normal functional activity. Of course, there are instances, particularly in virgins, in which the functional disturbance evidenced by the leucorrhea is dependent largely on malnutrition or one pelvic congestion from extragenital causes. The mild leucorrhea found in anemic or cachectic patients may disappear when the patient is put in good general health. Again, in pelvic congestion from heart disease, or from some general cause, there may be present a mild leucorrhea, which disappears when the functional pelvic congestion is corrected. In this sense leucorrhea may be said, in some cases, to be due to extragenital causes and its relief to depend upon treatment of same. In all but these exceptional cases, discharge from the genitals is due to one of the following local conditions:

Inflammation or Ulcer of Vulva.—There is a history of discharge from the vulva, of burning or itching, and of frequent urination, with perhaps some pain. Examination of the external genitals shows redness, either general or localized to certain areas. There is tenderness and discharge, and also evidences of the cause of the inflammation or ulcer. If the trouble is an ulcer, it may be simple, chancroidal, syphilitic, tuberculous or malignant.

Acute Vaginitis.—There is a history of a free yellow discharge of short duration, irritation of vulva and frequent urination, with some burning. Examination shows a yellowish discharge and redness of vulva. If gonorrheal, there is usually involvement of the vulvovaginal glands; also the discharge shows gonococci. The vaginal walls are rough and hot and tender—too tender to admit of satisfactory bimanual examination. When exposed with the speculum, the vaginal walls are reddened and there is not enough discharge from the cervix to account for the leucorrhea.

Chronic Vaginitis occurs principally in children. There has been a yellow discharge for several weeks or months, with irritation of the vulva and some bladder irritability. Examination shows a yellow discharge and redness of the vulva, with more or less tenderness. The discharge should be examined for gonococci. If the patient is a child, no vaginal examination is made. If an adult, examination shows tenderness and chronic thickening and roughness of vaginal wall, usually most marked in the posterior fornix. Speculum examination shows redness of vaginal wall, either general or in patches, and there is not enough discharge from the cervix to account for the leucorrhea.

Adhesive Vaginitis occurs principally near or after the menopause. There is a history of chronic discharge, with irritation of the vulva, and sometimes bladder irritability. On examination it is found in most cases that the discharge is slight and is sticky or "gluey" in character, though in exceptional cases it is free and purulent. In some cases there are scratch marks, resulting from the patient's attempts to overcome the pruritis. On vaginal examination the vaginal walls are found adherent in spots, especially at the upper part of the vagina. If the adhesions are recent, they separate easily, with some bleeding. If the adhesions are old, they are firm, and in some cases the vagina is almost obliterated by the process. When the walls are separated with the speculum, in the less advanced cases, irregular spots may be seen which are raw and bleed slightly.

Ulcer cf Vagina may be simple, chancroidal, syphilitic, tuberculous, or malignant. There is a history of an acute or chronic discharge and probably also of other evidences of the disease causing the ulceration. Examination shows a discharge about the vulva and more or less irritation of the surfaces. When making the vaginal examination, the indurated edges or base of the ulcer may be felt. The speculum exposes the ulcer to view, and further investigation shows it to be the sufficient cause of the discharge.

Acute Endocervicitis.—There is a history of a tenacious, stringy discharge of recent origin. There may or may not be irritation of the external genitals. Vaginal and bimanual examination show nothing special. Speculum examination shows a stringy, tenacious discharge coming from the external os. There is also congestion of the cervix and usually erosion about the external os.

Chronic Endocervicitis.—There has been a discharge for a long time. Vaginal and bimanual examination show no evidence of involvement of the corpus uteri or the adnexa. Speculum examination shows a very tenacious stringy, mucopurulent discharge from the external os, with more or less surrounding erosion. In many cases there has been also severe laceration of the cervix, the evidences of which may be felt and seen.

Laceration of Cervix.—In these cases the discharge is not due so much to the tear itself as to the subsequent eversion, and irritation and chronic inflammation. The various appearances presented by the lacerated cervix are shown in Figs. 463 to 472.

Ulcer of Cervix may be simple, chancroidal, syphilitic, tuberculous or malignant. There is a history of leucorrhea. In the vaginal examination the ulcer of the cervix may or may not be felt, depending on whether or not there is any induration in the edges or base. When the cervix is exposed with the speculum, the ulcer is seen, presenting a distinctly marked margin and a base of granulation tissue.

Malignant Disease of Cervix may appear in the form of an ulcer, with indurated margins and base, or as a papillary growth from some spot on the cervix or within the cervix. For the various appearances of beginning malignant disease of the cervix see Figs. 668 to 675 and 684 to 687.

Polypi of Cervix of various kinds may give rise to considerable leucorrhea, though usually a bloody discharge is the prominent feature in these cases (Fig. 490).

Acute Endometritis, whether gonorrheal or due to pus infection following labor or miscarriage, gives rise to free discharge. There is a history of recent labor or miscarriage, or instrumentation or gonorrhea, or a history of chronic endometritis due to one of these causes. Examination shows a free discharge, the character of which points to the cause of the trouble, as explained in Chapter VI. Vaginal and bimanual examination show tenderness of the body of the uterus, but no tenderness around the uterus unless there is complicating trouble. Speculum examination shows a free purulent discharge coming from the uterus.

Chronic Endometritis.—There is a history of chronic leucorrhea. Examination shows nothing in the vagina or cervix to account for the discharge. The body of the uterus may be somewhat enlarged or tender, though not necessarily so. Through the speculum it is seen that the discharge comes from the uterus and not from inflammation of the vaginal wall. The character of the discharge indicates that it comes largely from the endometrium and not from the cervical glands.

Retrodisplacement of Uterus causes leucorrhea when associated with a chronic endometritis.

Fibroid of Uterus causes leucorrhea by causing chronic irritation of the endometrium, both by direct pressure and by interference with its blood supply.

Cancer of Corpus Uteri causes leucorrhea by the breaking down of the cancerous area and also by the chronic irritation of the adjacent endometrium.

Periuterine Disease causes leucorrhea by causing chronic congestion of the endometrium, with the resulting endometritis.

Functional Disturbances may cause leucorrhea either through congestion of the uterus or through endocrine influence.

Treatment

For the purpose of considering treatment, it is convenient to divide the cases of leucorrhea into three classes.

1. **In the Virgin.**—Leucorrhea is not an infrequent complaint in the virgin. It may be due to local malnutrition and loss of tone from marked anemia (dependent on chlorosis or other cause), it may be due to pelvic congestion from obstruction to circulation by heart disease or liver disease, or other extragenital affection, or it may be due to functional pelvic congestion incident to the occupation or other condition mentioned under Menorrhagia. In the virgin it is assumed that the leucorrhea is due to one of these causes, unless evidences of decided local disease are present, and treatment is given accordingly. The treatment consists of the following measures:

a. The administration of iron and other tonics internally and the employment of the other measures mentioned in the tonic regimen for the treatment of anemia accompanying amenorrhea. If there is any indication for endocrine therapy, that should be confirmed with the general tonic course.

b. The use of laxatives and other measures required to overcome any chronic constipation that may be present.

c. The administration of some uterine astringent for the purpose of diminishing the congestion of the endometrium. Ergotin is a very good preparation for that purpose. The uterine astringent is specially indicated for those cases accompanied with excessive menstruation.

d. Where the discharge persists after the patient has been put in good general health by the measures mentioned above, a vaginal douche may be ordered to be taken once or twice daily. It is well to start with a mildly astringent solution, such as the alum douche (one teaspoonful of powdered alum to two quarts of hot water) or the aluminum acetate douche, and advance to the stronger astringents, such as the zinc sulphate and the alum douche, if necessary.

e. Local examination, with such subsequent treatment as is necessary for the particular local lesion found. In the virgin this is reserved for those cases in which the discharge persists after the employment of the measures above given or in which the evidences of local disease are so marked that an examination at once is necessary.

2. **With Marked Local Lesion.**—In the married woman, who comes complaining of leucorrhea, an examination is ordinarily made at once in order to determine whether any marked lesion is present. In these cases, and also in exceptional cases of the previous class in which an examination is finally necessary, it may be found that there is a decided local lesion, or that, on the other hand, the parts show no decided lesion.

When a marked lesion that constitutes sufficient cause for the leucorrhea is present, it should, of course, receive the appropriate treatment. The various lesions that may cause a discharge from the genitals have just been mentioned in the preceding pages, and the treatment required for each lesion is detailed in the chapter dealing with such lesion. In many of these cases the leucorrhea is a very subordinate feature, the treatment being principally for the relief of more serious symptoms. In the case of many patients with a chronic uterine discharge, in which there is a more serious disorder requiring some operative procedure, it is well to curet the interior of the uterus at the same time in order to check the discharge.

3. **Without Marked Lesion.**—In some patients with troublesome leucorrhea the examination shows no marked lesion. There is probably a mild chronic endometritis or hyperplasia of the endometrium, but there is nothing that gives rise to any symptoms other than the leucorrhea, with perhaps a slight tendency to excessive menstrual flow.

In such a case employ the measures just mentioned for treatment in the virgin. If these do not suffice, then a few astringent intrauterine applications may be made if the cervix dilates easily. If the leucorrhea still persists to a troublesome extent, thorough curettage of the interior of the uterus under anesthesia should be employed. The curettage should be followed by a general and local tonic regimen, that the new endometrium may develop under bettered conditions.

In suspicious cases of persistent uterine discharge, the material removed in the curettage should be submitted to microscopic examination, that the presence or absence of malignant disease of the endometrium may be positively determined.

BLOODY DISCHARGE

Bleeding not connected with menstruation may vary from a streak of blood, or a slight coloring of a mucopurulent discharge, to a free flow of blood. Occasionally there is a hemorrhage sufficiently free to threaten the patient's life. In most cases, however, the bloody discharge is slight and irregular, and is of serious import only because it may have a serious condition for its cause.

Causes

Any of the following disorders may cause a bloody discharge from the genitals, the character of the discharge varying from a mucopurulent discharge, only streaked with blood, to a profuse flow of blood and clots. All of the following conditions give rise, also, to leucorrhea:

Inflammation of Vulva.
Acute Vaginitis.
Chronic Vaginitis.
Adhesive Vaginitis.
Ulcer of Vagina.
Acute Endocervicitis.
Chronic Endocervicitis.
Laceration of Cervix.
Ulcer of Cervix.
Cancer of Cervix.
Polypi of Cervix.
Acute Endometritis.
Chronic Endometritis.
Subinvolution of Uterus.
Retrodisplacement of Uterus.
Myoma of Uterus.
Cancer of Corpus Uteri.
Periuterine Disease.
Functional Congestion.
Ovarian Hyperactivity.

The following other conditions occur with pregnancy and must be thought of whenever a bloody discharge is complained of:

Threatened Miscarriage.—The patient may have missed the menses only a few days or may be several months' pregnant. Threatened miscarriage is usually accompanied by considerable pelvic pain. In exceptional cases there may be a bloody discharge for several hours, or a day or two, before pains begin. In some cases, by questioning the patient, it will be found that, failing to come unwell at the proper time, she has been taking medicine to produce an abortion ("to bring on the flow").

Miscarriage.—Here there are sharp, cramp-like pains, with the expulsion of blood clots and pieces of membrane or a formed fetus, depending on the period of pregnancy at which the accident occurs. Then the pain subsides and after a few days the bloody discharge ceases.

Incomplete Miscarriage.—The uterus is not entirely emptied and the retained remnants cause a persistent bloody discharge for one or two weeks after it should have stopped, and there is resulting subinvolution of the uterus. The blood may pass as a mucosanguinous discharge or in clots. It may disappear when the patient stays in bed, to reappear when she gets up. This is perhaps the most frequent cause of persistent bleeding in women of the child-bearing age. There is usually little pain after the miscarriage has taken place. The principal symptom is the bleeding, with the resulting anemia and weakness. If infection takes place, the symptoms of sepsis are added.

Placenta Previa.—Bleeding from this cause does not usually take place until the pregnancy has advanced so far that the diagnosis is perfectly clear.

Laceration of Cervix with Pregnancy.—The cervix is lacerated, everted and eroded, and there is added the softening and congestion from pregnancy. There are no pains such as accompany miscarriage. There may be some slight pain and uneasiness in pelvis, which is relieved by lying down. The bloody discharge persists, off and on, without apparent evidence of threatened miscarriage or other intrauterine disturbance.

Tubal Pregnancy.—The rupture of a tubal pregnancy, or a tubal abortion, is nearly always followed in a few days by an irregular bloody discharge, which may persist for several days or several weeks. In some cases pieces of membrane are associated with the bloody discharge. There are also the other evidences of tubal pregnancy (Chapter XI).

Treatment

In considering the treatment of bloody discharge from the genital tract, it is well to divide the cases into two classes—those with an evident local lesion and those without evident lesion.

1. **With Marked Local Lesion.**—In a certain proportion of the cases in which the patient comes complaining of a bloody discharge, the ordinary gynecologic examination will show a marked lesion of the external genitals, or the vagina or the uterus, of such nature as to account for the bloody discharge. The treatment required is the regular treatment for the particular lesion, the details of which are given in the appropriate chapter.

When there is free hemorrhage from the uterus, a firm vaginal packing or tamponade may be used for temporary effect. This is best applied with the patient in the Sims posture and the perineum retracted with the Sims speculum. The gauze or cotton used for the packing should first be dipped in an antiseptic solution and then squeezed as dry as possible. Gauze or cotton thus prepared is much more effective for checking hemorrhage than when perfectly dry. No firm vaginal packing should be employed in a pregnant patient as long as there is a chance of preserving the pregnancy, as such a packing might cause a miscarriage.

2. **Without Marked Local Lesion.**—The ordinary gynecologic examination shows no decided lesion. It is evident that the bloody discharge comes from within the uterus, but the history and examination show no other sign of uterine disease, except perhaps some menstrual disturbance. What is to be done for such a patient?

The following treatment should be employed:

a. **Tonics.**—It is important to overcome any marked anemia or general malnutrition by the administration of iron and other internal remedies as indicated and the employment of the other measures of an effective tonic regimen.

b. **Laxatives.**—The careful regulation of the bowels is needed, both for the local effect in diminishing pelvic congestion and for the general effect in improving nutrition.

c. **Uterine Astringents.**—Ergotin or stypticin should be given regularly, three to four times daily, for a period of two or three weeks in order to secure the full hemostatic effect. This is to some extent a diagnostic measure as well as a therapeutic measure. If the bloody discharge is due simply to subinvolution or a mild endometritis, it is likely to cease under these measures and remain away permanently if the treatment is continued for some months—long enough to restore the general health and the local tone.

d. **Curettage.**—If the bloody discharge persists in spite of above measures continued for a few weeks, it suggests that there is some decided change in the endometrium. This may be only chronic inflammation or it may, on the other hand, be beginning malignant disease. In such a case the interior of the uterus should be thoroughly curetted under anesthesia and the curettings submitted to microscopic examination. If the trouble is inflammatory, this is the most effective therapeutic measure. If the trouble is malignant, the diagnosis is thus made early, at a time when removal of the uterus will probably effect a cure.

e. **Organotherapy** is helpful in many of these cases—see Chapter XV.

f. **Radium and X-ray.**—If the patient is near the menopause, radium or x-ray may be used as in bleeding from small myoma (see Chapter VIII).

g. **Hysterectomy or Ovarian Operation** was formerly occasionally necessary in these cases of persistent serious bleeding without apparent lesion, but since using the perfected radium and x-ray treatment, the author has not so far found hysterectomy or oophorectomy necessary in this class of cases.

CHAPTER XV

THE INTERNAL SECRETORY GLANDS IN RELATION TO GYNECOLOGY

By Hugo Ehrenfest, M.D.

In the preceding chapters the fact has been repeatedly mentioned that the ovary is possessed of an internal secretory function which represents an important factor in the development, growth and normal function of the genital tract.

The problem of the function of the endocrine glands during the past decade has proved most attractive to many of the leading biologists and physiologists of the world. As the result of their persistent work, our knowledge has been greatly increased. The importance of this problem for the modern gynecologist is so generally appreciated that it seems essential to reserve a special chapter in this volume for a thorough discussion of the relation of internal gland function to gynecology.

The works of Gley (The Internal Secretions, 1915) and Falta (The Ductless Glandular Diseases, 1915) rank among the most authoritative and exhaustive studies of the entire subject of internal secretion. Schaefer (The Endocrine Organs, 1916) has compiled important facts, many the product of his own labor. The special field of the normal and abnormal function of the female genital apparatus under the influence of endocrine gland function is most interestingly discussed in a book by W. Blair Bell (The Sex Complex, 1916) and has been covered thoroughly in all its various aspects in a symposium prepared by eminent American investigators for the 1917 meeting of the American Gynecological Society (Transactions for 1917).

Much that will be said in the following pages must be duly credited to the writings of these recognized authorities.

HISTORICAL FACTS

It is interesting to note that the gonads, testicles and ovaries, were the first structures proved, by experiments, to possess a marked and definite influence on general metabolism and on the development, structure and function of other organs.

Berthold, in 1849, removed the testes of cockerels and transplanted them into other parts of their bodies. He found that the sex characteristics persisted, and thus, possibly was the first, to draw the correct deduction: The testes yield a product which acts on other organs of the body.

In 1889, Brown Séquard reported to the Biologic Society of Paris the re sults of experiments with the injection of testicle juice, proving to his satisfaction that these organs furnish substances, which, carried through the blood, exert a definite influence on other distant organs. This marks the beginning of organotherapy.

Ribbert, in 1898, and later Knauer (1900) experimented on female animals by transplanting their ovaries under the skin and avoiding involution of the uterus as would have otherwise occurred. Halban showed that in young animals transplanted ovaries will exert a protective influence on the development of the genital apparatus.

These were the fundamental experiments (as mentioned in Chapter XII) to prove the internal secretory function of the ovary. They explained satisfactorily the internal secretory function to such striking clinical phenomena as lack of development of the genital tract at the time of puberty, amenorrhea or the ablation symptoms after postoperative artificial menopause.

Of late some writers, more often clinicians than scientific investigators, have attempted to interpret many minor aberrations in the physical appearance or mental behavior of women, and almost all anomalies of sex function on the basis of a deviation in the internal secretory activity of the ovaries or other glands of the endocrine system. In the following discussion of the entire intricate problem an effort will be made to differentiate, as clearly as is possible, between proved facts, theory, or mere speculation.

DEFINITION OF INTERNAL SECRETION

Material of a nonmorphologic character, which is passed directly into the blood or lymph from any tissue or organ of the body forms its *internal secretion.* In the strict meaning of the term, only organs which are not known to possess any other function than that of passing such specific chemical substances into the blood or lymph, are *ductless, internally secreting, endocrine glands.* Under the term ductless gland, in this limited meaning, therefore, are comprised the thyroid, parathyroids, suprarenal capsules, or adrenals, the pituitary body or hypophysis cerebri, the pineal gland, or epiphysis cerebri, and thymus.

At present, however, it is quite evident that the production of specific chemical agents which, carried through the blood, *influence distant structures* is not confined to these ductless glands, but that identical active substances are also produced by other organs obviously serving another functional purpose.

Mering and Minkowski, in 1889, first demonstrated that the pancreas has an internal secretory function, in addition to its known external secretory function, of producing the pancreatic juice, so important in the digestion of food material within the intestinal tract. Pancreatic internal secretion now is known to be essential for the proper utilization of carbohydrates in the tissues.

A still more remarkable example of a combination of important external nd internal secretory activities in the same organ is supplied by the gen- glands—testicle and ovary.

It has been known from time immemorial—and the experiment is repeated daily for commercial purposes in thousands of animals, and is still practiced on man in certain Oriental countries—that the removal of the sex glands in the young male as a rule prevents the development of the accessory sex characteristics.

Reference already has been made to the fact that removal of the ovaries in the young female exerts a profound influence over the organism and prevents the appearance of many of the female characteristics. In some cases, even in the adult, removal or atrophy of the ovaries has been noticed to lead to the development of male characteristics. In young mammals removal of the ovaries is followed by arrest of growth of the uterus, which effect can be prevented by grafting an ovary from another animal of the same species into the peritoneum or elsewhere. It seems clear, therefore, that both in the male and female the effect of the removal of the gonads is due to the absence of a definite active substance normally produced by these glands.

The terms *ductless glands, internal secretion glands, or endocrine organs*, as now promiscuously used, therefore, apply to a number of special organs possessing the property of producing biologic substances which, absorbed into the blood *in normal amounts*, are capable of exerting a definite and specific influence on distant organs, and of maintaining the entire organism at par. Whenever their activity is either diminished (*hypofunction*) or increased (*hyperfunction*), they will cause a general disturbance in bodily function, which appears to be more or less characteristic of the special gland or glands so involved.

CHEMICAL NATURE OF INTERNAL SECRETIONS

The active substances produced by external and internal secretions seem essentially different from each other. In the case of the external secretions the active agents are always on the nature of a ferment. They belong to that class of bodies which are known as enzyms, probably are of a protein nature and readily destroyed by heat in the presence of water. The active materials of the endocrine organs, on the other hand, are for the most part not rendered inert even by prolonged boiling and are certainly of a much simpler chemical constitution than enzyms. The active material of the adrenal has been isolated in a pure crystalline form, and has even been prepared synthetically (Schaefer).

Some of these substances act instantly, very much like the active principles especially of vegetable drugs. Of interest in relation to our special subject in this respect are the extracts of the adrenals and of the pituitary body. Other active agents of internal secretion operate slowly. The effect of their action becomes apparent only after a prolonged period of time. This latter class usually exert a specific influence upon the growth and nutrition of special organs. They have been termed by Gley "morphogenetic." Most important among them are the internal secretions of testicle and ovary.

As with drugs, some of the active principles yielded by the endocrine organs act by stimulating cell function, others again depress or actually inhibit this function. Starling originally gave to the stimulating principles the name "hormones," derived from a Greek word meaning "to excite." By custom this term now is commonly applied to all the active principles of endocrine secretion and, therefore, includes also those of a depressing or inhibiting character. Varous efforts to replace this term "hormone," which really is incorrect, by others, as a whole seem to have failed.

INTERGLANDULAR RELATION

The present status of this aspect of the problem of internal secretion is described by Falta as follows: An immense amount of work in recent years has been devoted to the study of the reciprocal action of the ductless glands, and hypotheses and speculations have grown luxuriantly. It seems that up to the present we really know nothing exactly concerning the intimate process in these correlated actions; but in clinical experience the existence of such an interaction forces itself unmistakably upon the observer.

To illustrate the last part of this statement but a few examples germane to our subject may be cited. At puberty, when the first corpus luteum forms and ovarian function in its stricter sense begins, pineal gland and thymus involute while coincidentally the thyroid enlarges. Premature involution of the thymus seems to cause premature puberty; i.e., premature beginning of the process of ovulation. During pregnancy, when ovarian function is in a quiescent state, the hypophysis cerebri among the endocrine glands undergoes most marked changes, while slighter alterations commonly can be observed also in the function of the adrenals, thyroid, parathyroids, and pancreas. These facts are known, but their cause and their interrelation are not fully understood.

It is assumed that all the endocrine organs work harmoniously in form of an "interglandular reciprocity" or "chemical correlation" as one system. The equilibrium of the entire system presumably is disturbed by functional disturbance of only one gland of the system.

Loss of function in one gland may cause another to hyperfunctionate if the diseased gland under normal conditions does exert an inhibitory effect on the other. The other gland then is supposed to cooperate with the diseased gland in making up for the deficiency of the latter and such glands are called *synergists.* On the other hand, if formerly responsible for a stimulating effect on another member of the endocrine system, *hypofunction in one gland is supposed to induce hypofunction in another* if they are *antagonists.* In accord with this classification (of Okintschitz) ovary and thyroid seem antagonistic, while the relation between ovary and pituitary, pineal gland or thymus possibly is synergetic.

This synergism or antagonism of action existing between the various organs of the endocrine gland system Bell has attempted to express more concretely in the katabolic or anabolic influence, respectively, exerted by various internal secretory structures on the calcium metabolism. His conclusions concerning the chemical interrelation of all the endocrine glands in their ultimate effect both on all functional activities of the generative apparatus of woman and on the development of female physical and psychic characteristics, while not firmly proved, in general certainly are interesting and stimulating enough to be quoted in this connection.

The essential fact to be borne in mind, according to Bell, is that femininity itself is dependent on all the internal secretions. It formerly was thought that a woman was a woman because of her ovaries alone; but we no longer consider the gonads as acting alone in their influence on the female characteristics and genital functions, except in regard to the production of ova. The ovaries should be looked upon solely as a part of the system to which most, if not all the endocrine glands belong, and in which these other organs in relation to the reproductive functions figure with as great importance as the ovaries themselves.

At birth we distinguish the sex of the child by the character of the external genitals, which in normal circumstances correspond with the internal genitals. These genital features are generally held to constitute the primary sex characteristics. The secondary characteristics, however, constitute the *sex ensemble,* seen not only with respect to the general conformation of the body (pelvis, fat distribution, breasts, etc.), but also in connection with the specialized functions peculiar to the sex, both physical and psychic. There are two stages in the development of the secondary characteristics. The first stage extends from birth to puberty. The development is slow, the genital functions themselves are dormant. At puberty, however, comes the remarkable change, physical and mental.

Although the genitals may be normal morphologically at birth (fetal development) yet they only become functionally active at puberty (complete development) if the whole endocrine system is in perfect harmony, and is acting efficiently and normally in regard to its sexual function. Thus, thyroid or pituitary insufficiency may cause the genital organs to remain infantile. Diseases of these structures may cause retrogression in the genitals, and even after they had functionated normally, thus causing cessation of menstruation, sterility, etc. Furthermore, it is believed that the gonads and uterus remain not fully developed until the thymus atrophies at the time of puberty.

An explanation for this interrelation, both in form of synergism and antagonism, possibly is suggested in the fact that, according to the investigations of Bell, ovaries are katabolic in regard to calcium metabolism by promoting calcium excretion, while, on the other hand, it is believed that the thymus produces calcium retention, so essential for the normal growth of the child up to puberty. The phenomenon of calcium retention again becomes characteristic late in life during the climacteric; i.e., after the cessation of all ovarian activity.

In Bell's opinion, also the physical and mental characteristics come under the dominant influence, not only of the ovaries, but of the entire endocrine system. "The endocrine organs," Bell writes, "represent structures in which qualitative and quantitative changes influence metabolism towards masculinity or femininity, as the case may be. It is interesting and instructive to note that changes similar to those occurring in the pituitary and suprarenals *during pregnancy,* which produce calcium retention for the benefit of the fetus *without producing masculinity* in the mother, may in the *non-pregnant* woman produce the *characteristics of masculinity,* and not so rarely, not only physical, but also masculinity in the mental processes."

In finally summing up the question of interglandular relationship to the genital tract it may be said that a reciprocity of action does exist, beyond any doubt, that only perfect harmony between all the endocrine glands seems to lead to normal development and later to normal function of the generative apparatus in the female. At the present time, however, our knowledge is still too limited to formulate any definite statements as to the exact mechanisms of this correlation. As will be seen later, it is the lack of definite information concerning this feature of the entire problem which of necessity renders organotherapeutic efforts for the present chiefly only empirical or experimental.

INFLUENCE OF INDIVIDUAL ENDOCRINE ORGANS ON THE GENITAL APPARATUS

Whatever knowledge we have on this special question in the main has been acquired in the following manner:

a. By clinical observations in those cases in which the functional activity of one of the internal secretory organs was altered, either in form of hypofunction or hyperfunction, by evident pathologic processes in the organ.

b. By clinical observations on patients in whom one of the endocrine organs had been removed by operation for definite reasons.

c. But chiefly, by experiments on animals carried out both in form of removal of such organs, or by injection of various forms of extracts made from endocrine gland tissues.

A simple reflexion will show how readily these three sources may lead to most misleading errors.

The extirpation of an endocrine organ by operation or for the purpose of the experiment certainly is but a poor, if not entirely incorrect, imitation of the rather gradual and usually incomplete suppression of functional activity of this same structure as the result of a pathologic process.

Watery or ethereal and alcoholic extracts, juices obtained by crushing and compression of certain tissues, and preparations made in various other manners, to be injected for experimental study, are supposed to contain the specific hormones. It is obvious that such so-called extracts not necessarily contain any or all the active agents, or in any definite concentration. The injection of such an extract apparently often means the parenteral introduction of protein substances and many of the phenomena obtained in such experiments and interpreted as hormone action, now are correctly recognized as anaphylactic symptoms.

It is now generally appreciated that definite observations, clearly established for one species, are absolutely incorrect for another species. It is this fact which explains the often contradictory results obtained by experienced investigators when the one was making his experiments, e.g., on cats, the other possibly on guinea pigs or rabbits.

A striking lack of discrimination in this respect has been shown by many clinicians. They have insisted in the past, and, unfortunately, still at the present time insist, upon applying to the human being, facts established solely by animal experiments concerning the normal or abnormal functional activity of this or that endocrine gland. This reprehensive practice is responsible for much of the confusion now existing.

A serious attempt to bring order into this confusion, so far as the relation of each ductless gland to the female genital apparatus is concerned, has been made in a symposium prepared for the 1917 meeting of the American Gynecological Society, already mentioned in preceding pages (see Ehrenfest, Interstate Medical Journal, 1917). Some of the material presented in these valuable contributions of well-known American scientists will be used for the following outline of the rôle played by the individual endocrine organs in the development and function of the sex tract in woman.

1. Ovary

Normal Function.—There are three different structures in the ovary which must be considered in relation to its internal secretory activity: the follicle apparatus, the corpus luteum, and the interstitial gland.

The follicle, containing the ovum, obviously is the most important of the constituents. It not only accomplishes primarily the double function of supplying the ovum and presumably a definite internal secretion, but secondarily it also gives origin to two new structures; viz., the corpus luteum and the so-called interstitial gland. After rupture of the mature graafian follicle, the granulosa cells transform into the typical pigmented lutein cells. The possibility, however, cannot be entirely excluded that some of the theca cells participate in this transformation. Obviously only a very small percentage of the thirty thousand or more graafian follicles of the newborn female child actually reach maturity and give rise to corpora lutea. The overwhelming majority degenerate and become atretic. In the opinion of some investigators (e.g., Fraenkel, Wallart, and others), at least in certain species, a derivative of the end products of follicle degeneration represents the so-called interstitial gland. This view, however, is not shared by others (e.g., Aschner) who regards the interstitial gland of the ovary as a distinct morphologic entity. So far as the human being is concerned, it may suffice in this connection to state that the so-called interstitial gland, whatever its origin might be, is found only [illegible] apparently marks the end of its existence. [illegible] unmistakably constitutes one of [illegible]

[illegible] therefore, may assume that [illegible] interstitial gland in woman of [illegible] formative period of life, and [illegible] not conceivable. It may not be amiss to emphasize here that the important studies of M'Ilroy *on animals* have gone to show that the presence of interstitial gland cells is necessary for the continuation of ovarian function in transplanted ovaries.

The most important factor, however, in the internal secretory function of the ovary, as rather generally conceded, is supplied by the *corpus luteum.* In its full development it presents the characteristic picture of an endocrine gland: large pale cells of epithelial character lying closely attached to a rich network of thin-walled vessels.

The fundamental experiments and clinical observations establishing the function of the corpus luteum we owe to Fraenkel; a more accurate knowledge of the finer mechanism of corpus luteum function in certain animals, to the painstaking investigations of Leo Loeb. Again we must emphasize that his findings cannot be assumed to be necessarily true also for woman. He, himself, most carefully points out the striking differences, evident in minor details and essential features, between various species of animals. Loeb's most important conclusions are as follows: Cyclic changes occur in the ovary and secondarily in the uterus and mammary glands. The primary cyclic changes in the ovary are in sequence: follicle ripening, ovulation, and corpus luteum formation. An elaborate, self-regulating mechanism controls ovulation. Normally the corpus luteum inhibits ovulation. During pregnancy the life of the corpus luteum is prolonged. Experimentally ovulation can be influenced at will, accelerated by excising all corpora lutea, or retarded by producing artificial deciduomata. The retarding effect of the corpus luteum is chemical, not mechanical. The corpus luteum has a sensitizing effect on the uterus (endometrium). If the uterus is incised or mechanically stimulated during the time when the corpus luteum is elaborating its growth hormone, a maternal placenta (deciduoma) is formed. The mechanical stimuli, therefore, in this respect assume the function which the fertilized ovum exerts under normal conditions.

Corresponding to, and dependent upon, the cyclic ovarian changes uterine cyclic changes occur. Growth activity is the result of corpus luteum secretion. Regression marks the cessation of this secretion, which in the interval is followed by a condition of rest.

It follows that the corpus luteum subserves at least two functions, inhibiting ovulation and producing a substance which causes growth in the uterus.

The ovary shows other noncyclic functions. It has a trophic influence on the genitals and, either primarily or secondarily determines the development of the secondary sex characteristics. The ovary, likewise, controls the development of the mammary gland. It exerts a trophic influence on this organ and determines its normal cycle.

These findings of Loeb in animals seem to support Fraenkel's earlier claims, based partly upon experiments and partly on clinical observations, that the corpus luteum prepares the endometrium for the reception of the fertilized ovum. If impregnation fails to occur, the endometrium undergoes retrogressive changes which find their outward expression in form of the bloody menstrual discharge. Corpus luteum function probably also is required for the integrity of the implanted ovum during the first few weeks of pregnancy. Removal of the ovary containing the corpus luteum (or corpora lutea) of pregnancy, or particularly bilateral oophorectomy early in pregnancy, both in the human and animals, almost invariably results in abortion. Corpus luteum function, at least in the human, is not essential in the later normal progress of pregnancy.

Before discussing ovarian function in general, we may emphasize once more the fact that there still exists considerable divergence of opinions in regard to the question of which among the different structures of the ovary actually is essential in the maintenance of its endocrine activity. As already mentioned, M'Ilroy considers the presence of interstitial gland cells as necessary. Others, and they seem at the present time in the majority, lay more stress on the importance of the corpus luteum. On the other hand, it cannot be denied that at least temporary success in avoiding the typical castration symptoms has been recorded, both in the human and in animals, even when the successfully transplanted piece of ovarian tissue did not exhibit any signs of ovulation or of the formation of a corpus luteum. This latter point becomes significantly important in the classic experiments of Steinach (Ztschr. f. Physiol., 1913). He found that transplantation of *ovarian* tissue upon castrated *male* rats is followed by the development of typical *female* characteristics, such as enlargement of the breasts and changes in the skeletal structure, although every graafian follicle had become atrophied in the transplanted ovarian tissue.

The following facts concerning ovarian function can be accepted as established: The ovaries provide the ova, and a specific internal secretion, or possibly secretions. On the influence of these specific agents, when provided in normal quantity, depend (a) the development of the generative organs from birth to puberty; (b) the establishment of puberty at the proper time, manifesting itself in the appearance of the first menstrual flow, and the development of the secondary sex characteristics; (c) the normal continuation of the cyclic endometrial changes expressed in a normal menstrual discharge recurring in rather regular intervals; (d) sensitizing of the endometrium so that its mechanical irritation by the implantation of the fertilized ovum leads to the formation of the maternal placenta; (e) a certain protection of the implanted ovum in the earlier stages of pregnancy; and (f) trophic growth stimulation of the mammary glands during pregnancy.

Complete absence of endocrine ovarian secretion results (a) *in the young*, in arrest of further development of sex apparatus (infantile genitals). Menstruation fails to appear, female secondary sex characteristics develop incompletely; both in physical and mental characteristics, a certain degree of masculinity may become noticeable; (b) *in the adult*, in cessation of the established functional activity of the genital apparatus (amenorrhea, artificial menopause, sterility, etc.), with progressive evidences of retrogression (atrophy of uterus and breasts, etc.), possibly associated with a slight change of certain physical and mental characteristics of femininity to those of masculinity. The cessation of established genital function, especially when appearing suddenly, often is followed by definite disturbances in the vasomotor system (hot flushes, palpitation, sweating, etc.), alterations in the general metabolism (leading to adiposity in 50 per cent of the cases) and indefinite mental changes. The phenomena of this latter group do not occur constantly.

The evident individual variation in this respect once more forces to mind the probable fact that the ovary functionates but as a part of the entire endocrine system. The ovaries, Bell suggests, are concerned in the temporary function of reproducing the species (by providing ova), and by their hormones influence the general metabolism of the body solely to the benefit of the reproductive activity of the individual. "The differences in the effects produced by oophorectomy in women are largely dependent on the individual variations which we know to exist with respect to the relative adjustment of all the internal secretions. They are often evident in the outward characteristics of adiposity and thinness, lethargy and brightness, and in many other physical and psychic attributes. It is clear, therefore, that if one woman be better adjusted than another against the removal of all ovarian secretion, she will show less the signs of menopause."

After this consideration of the definite and established effects both of normal endocrine ovarian activity, and complete absence of this activity, we shall turn to a discussion of the less known, and, in many aspects, only hypothetic, results of anomalous internal ovarian secretion in form either of hypoactivity or hyperactivity. At the outset the fact must be emphasized, that *we do not know any characteristic histologic pictures indicating anomalies of function in the ovary.* It is a fact that in many instances, almost as the rule, even extensive involvement of ovarian tissue in pathologic processes, especially new growth, cyst formations, etc., does not lead to the symptoms usually ascribed to hypofunction. Only occasionally writers insist upon an etiologic relation of the presence of small cysts in the ovaries to the symptoms of hyperfunction.

Hypofunction may be primary or secondary (Frank). *Primary ovarian hypofunction* is due to developmental anomalies in the prepuberty stage and, therefore, is likely to be associated with general stigmas of maldevelopment, especially in the skeleton. Obviously in many of these women, there can be discovered also variations in the secondary characteristics (anomalous distribution of hair or fat, etc.), with certain nervous symptoms indicating instability (especially of the vosomotor system) and, of particular interest to the gynecologist, permanent local stigmata of maldevelopment (such as infantile uterus).

Symptomatically ovarian hypofunction, therefore, may express itself in (a) amenorrhea, (b) scanty and painful menstruation, appearing irregularly and often at long intervals, and (c) possibly sterility, encountered usually in an asthenic woman with the stigmas of general infantilism.

Secondary ovarian hypofunction usually occurs in consequence of diseases of other endocrine glands (exophthalmic goiter, myxedema, acromegaly, distrophia adiposogenitalis, Addison's disease, diabetes, etc.). Particularly in these diseases the clinical symptoms of hypofunction of the ovary often are preceded by a transitory period of apparent hyperfunction.

Secondary hypofunction commonly is the temporary or permanent result of wasting diseases (tuberculosis, typhoid, etc.), or of other weakening influences (labor and subsequent lactation). The general metabolism of the body requires all its energies to concentrate in an effort of combating the disease or to make up for the serious loss of body fluids (milk secretion). The ovary proves a most sensitive organ in reacting to any general disturbance which depresses the equilibrium of normal metabolism of a woman below par (see Ehrenfest, Reappearance of Menstruation after Childbirth, Am. Jour. Obst., 1915).

Some of the clinical symptoms of hypofunction or of complete absence of function, at present, often are intentionally produced by subjecting the ovaries to the effect of x-rays or radium, as in the treatment of uterine myoma (see Chapter VIII).

Hyperfunction may be also conveniently divided into a primary and a secondary form.

Primary ovarian hyperfunction is a condition almost characteristically limited to the beginning (puberty) and end (menopause) of the period of reproductive activity.

The clinical symptoms consist in an exaggeration both of amount and duration of the menstrual flow (menorrhagia) or in more or less severe uterine hemorrhages occurring at irregular intervals (metrorrhagia). In these cases the endometrium very often is found in a state of simple hyperplasia (see Chapter VI), devoid of any histologic signs of inflammation.

It has been suggested that primary functional hyperactivity of the ovaries represents the underlying cause for the development of uterine fibromyomata.

Secondary ovarian hyperfunction often is met with only as a transitory symptom at the onset of disease in another endocrine gland (mentioned above) soon followed by the symptoms of hypofunction.

The discovery of Hitschmann and Adler of the identity of some of the cyclic changes in the endometrium with histologic findings, heretofore considered characteristic of endometritis, have furnished valuable support for the contention of preceding investigators that menorrhagia and metrorrhagia, commonly seen in cases of pelvic inflammatory processes or uterine malpositions, are not caused by an endometritis, but, in fact, are the expression of a *secondary ovarian hyperactivity*, the result of ovarian overstimulation by a local active or passive congestion.

The repeated confirmation of the work of Hitschmann and Adler by almost all subsequent investigators tends to prove the correctness of their assertion, at first repudiated as too radical, that with the exception of the instances of carcinoma or other destructive processes in the endometrium, of uterine polypi, and of abortions, practically all other types of atypical uterine hemorrhages are due to anomalies of endocrine ovarian activity.

2. Thyroid Gland

Marine (Trans. Am. Gynec. Soc., 1917) summarizes his investigations as follows: "The relation of the thyroid to the sex organs in the female is the most ancient and classical illustration of the interrelation of the function of glands with internal secretion. Such a thyroid-sex gland relation in the female is recognizable in association with the development of secondary sex characteristics at puberty, with menstruation and with pregnancy, and also in the male with puberty, but to a very slight degree. *During each of these periods the body metabolism is increased, and as it is a major function of the thyroid to stimulate oxidation processes in the body, it is probable that the heightened metabolism is of thyroid origin* and that the enlargement of the thyroid at these times is the result of a true work hypertrophy. This view is supported by the fact that administration of the iodine-containing hormone or even of iodine, from which the gland can elaborate its own hormone in increased amounts, prevents the hypertrophy, and in any developing hypertrophy of the gland the iodine is reduced."

It is usually stated that the thyroids in women are larger per unit of body weight than in men. This in general is true, so far as anatomic statistics can go, but it has misled some writers to imply that the difference is inherent, while in fact it is acquired and can be entirely controlled. It is well known that thyroid hyperplasia in form of the simple goiter is from six to eight times more common in the female than in the male during and after adolescence. Up to adolescence no difference can be seen between the two sexes. A similar prevalence of females can be noticed among patients suffering from Graves' disease. Extensive studies of this striking fact, however, so far have not yielded any definite clue to the exact nature of thyroid-sex gland relation. It must be assumed that the mutual influence of the one gland on the other somehow is connected with alterations in the iodine component of general metabolism since all the known physiologic activity of the thyroid is associated with iodine.

3. Parathyroid Glands

The parathyroid glands, according to Voegtlin and Pool, have a definite physiologic function which is still incompletely understood. The presence of a minimum of tissue in the body is essential for life and for the continuation of normal metabolism. No direct relationship, however, has been established between the parathyroids and the female sex organs; no morphologic changes in the glands have been noted during pregnancy; yet apparently there is a connection between the parathyroids and the sex processes in the female.

Tetany, the clinical evidence of parathyroid insufficiency, is somewhat prone to occur in menstruating, pregnant, and puerperal women, as well as in patients suffering from gynecologic troubles or who have undergone gynecologic operations. Pregnancy puts an extra strain on the function of the parathyroids, as evidenced by the appearance of tetany during this period in partially parathyroidectomized animals. Tetany also has been observed during lactation in animals with parathyroid insufficiency. Interruption of lactation was followed by recovery.

The function of the parathyroids is apparently closely connected with calcium metabolism. There is reason to believe that pregnancy tetany and lactation tetany are associated with calcium deficiency. Latent tetany, or a subtetanic condition, is much more common in puerperal women than is usually assumed; according to Seitz and Thierry it occurs in ten per cent of all women during the last months of pregnancy, or in the course of childbirth.

The offspring of partially parathyroidectomized animals exhibit a marked increase in nerve irritability. Tetany in newborn infants of tetanic mothers is usually fatal within a short time after birth. In the treatment of tetany of pregnant women the administration of calcium in large doses is followed by beneficial results in the great majority of cases.

Experimental facts do not support the theory that eclampsia is due to hypoparathyroidism.

4. Pituitary Gland

The status of our present knowledge concerning the influence of the pituitary gland on sex processes in the female is concisely presented in the following quotations from a paper by Goetsch.

Abundant experimental evidence and numerous observations on pituitary disturbances in the human subject have clearly established the close interrelation in function between the pituitary and sex glands. Overfunction of the pituitary anterior lobe is associated with overactivity of the sex glands. "If it were possible to examine the sex glands in the early stages of gigantism and acromegaly one would, in all probability, find histologic evidences of very active spermatogenesis in the male and abundant ovulation in the female." The pituitary gland undergoes a kind of involution from the hyperactive stage in acromegaly, and the early increased libido and hyperactivity of sexual function changes into loss of libido and even impotence in the male, and leads to cessation of menstruation and sterility in the female (secondary ovarian hyperfunction and subsequent hypofunction). Deficiency in pituitary secretion is followed by underdevelopment and aplasia of the genital tract in the young (primary ovarian hypofunction) and by sexual inactivity and retrogression in the adult. Yet very recently (Jour. Am Med. Assn., January 21, 1922) Frank asserts that not only his own, but also the studies of Sisson and Broyles, clearly disprove that anterior lobe extract is capable of stimulating the growth of the sex organs.

Primary alterations in the function of the sex glands, as in pregnancy and after castration, are followed by pituitary hypertrophy and hyperplasia.

The specific action of posterior lobe extract (pituitrin, pituitary liquid. etc.), upon the smooth musculature of the uterus and bowels has led to the wide usage of this drug in obstetric practice and in the treatment of intestinal paresis following abdominal and pelvic operations.

5. Adrenal Bodies

From a thorough study of this question by Vincent we learn the following facts: The adrenal cortex or adrenal proper is developed from the germ epithelium, and the evidence now is strongly in favor of the view that it has certain important functions in connection with the development and growth of the sex organs. There is a considerable amount of clinical evidence that tumors of the adrenal cortex are frequently associated with sex abnormalities. Adrenal hypernephromata in children—more commonly seen in females—are almost invariably characterized by precocious growth of the body generally and of the sexual organs in particular. This same evidence also favors the view that when cortical tumors occur in the female, an accentuation of male secondary characteristics develops, and simultaneously a hypoplastic condition of the internal genitals supervenes (Glynn, Quart. Jour. Med., 1918). During breeding and pregnancy the cortex enlarges.

6. Thymus

Pappenheimer, who did much important experimental work on thymus function, expresses himself rather sceptically concerning any positive information at present available.

The vigorous research, he writes, that has been expended on the thymus gland during the past few years, has not, on the whole, been very fruitful. That the thymus serves an important function especially in the growing organism and has a constant relation to the development of the sex organs cannot be doubted. But there is a striking conflict as to facts and interpretation. It is impossible to draw any far-reaching conclusions as to the importance of the thymus in relation to the disorders of the female genital tract. The earlier work of Klose and his successors adduced a massive array of experimental work in favor of the view that the thymus is an essential organ exerting a controlling influence upon growth and bone formation. A number of other investigators, however, including Pappenheimer, have failed to substantiate these findings. "The fundamental problems of thymus physiology remain unsolved, and the established facts concerning normal and abnormal structure of the gland, are not such as lend themselves to clinical application."

7. Pineal Gland

In a study of the histories of forty cases of pineal tumors collected from literature, Marburg attributes to the condition the following characteristics: *General symptoms* of intracranial pressure, if an internal hydrocephalus has developed; *localized symptoms,* if the tumor compresses adjacent structures (quadrigeminate bodies, cerebellum, etc.), and *constitutional symptoms,* if pineal gland function is deranged. This constitutional syndrome consists of (a) early sexual maturity, evidenced in large sex organs, pubic hair, general body hair, early change in voice; (b) precocious mental development, and (c) general body overgrowth.

On the other hand, McCord emphasizes, the literature contains records of many cases of pineal tumors which, though appearing before puberty, did not show any signs of precocity of development that are so striking in a few selected cases. "A study of the clinical material reveals how little consideration has been given to the possibility of pluriglandular involvement." Experimental work so far has yielded only rather contradictory results. Evidences at present available that link the pineal body with a glandular function are very indefinite and "doubt is frequently expressed that the pineal body is more than a functional vestige of what once, in earlier evolutional stages, was a functionating eye."

The inference is allowable that the pineal body is an internal secretory gland of minor significance in the general activities of the endocrine system. Because of its involution at puberty, constitutional symptoms of pineal pathology presumably are confined to prepuberal years.

8. Pancreas

According to Carlson there does not exist at the present time any evidence of any specific relations of the endocrine functions of the pancreas and the gonads, male or female, or to menstruation, pregnancy or lactation. True diabetes, induced in animals after conception, leads to abortion. Absolute diabetes renders conception impossible. Partial diabetes under careful dietary control permits of normal sex life in women (menstruation, normal pregnancy, normal child, lactation), and pregnancy under such conditions does not aggravate the diabetes. But in the absence of such dietary control, pregnancy will aggravate the mother's diabetes; and uncontrolled diabetes in the mother is extremely injurious to the fetus. There is some evidence that in late stages of pregnancy the fetal pancreas may functionate also for the mother.

9. Placenta

While not coming strictly within the limits of this discussion of the relation of internal secretions to gynecology, it may be permissible, for the sake of completeness, to refer here briefly to the question whether the placenta can be regarded as a gland with an internal secretion.

This question has been answered in the affirmative for the first time by Halban. He based his theory chiefly on clinical facts. Frank (Surg., Gynec. and Obst., 1915), recently has fully confirmed the experiments of Herrmann which established definitely the fact that the placenta exerts a specific action on uterus and breasts. Placental extracts, especially the lipoid fraction, rapidly induce hyperplasia of the uterus and breasts, in castrated and in noncastrated animals.

Interesting is the indisputable observation that a lipoid substance extracted from placental tissue in its physical, chemical and biologic properties appears to be identical with a similar substance obtained from the corpus luteum. This apparent identity leaves the question of specific placental hormones still open, since there remains the possibility that the placenta acts merely as a storage reservoir for corpus luteum secretion during the latter part of pregnancy.

GYNECOLOGIC ANOMALIES DUE TO DISTURBED ENDOCRINE GLAND FUNCTION

A consideration of gynecologic anomalies, or, more correctly expressed, of certain gynecologic findings and symptoms in their etiologic relation to functional disturbances of the endocrine system, of necessity, requires repetition of much that has been stated in the preceding pages. A rearrangement of certain facts, however, in accord with conditions commonly dealt with by the gynecologist will render all available knowledge concerning this interrelation more accessible for ready application in actual work.

A note of warning must be sounded first. By common usage we differentiate diseases into organic and functional. The first group represents conditions due to definite structural alterations, while the latter group is meant to comprise the diseases of obscure pathology (see Chapter XIV). In the light of our present knowledge, furthered chiefly by physiologic and biochemic research work, such a sharp distinction is no longer possible. While not exhibiting any pathognomonic tissue lesions, many of the so-called "functional" diseases, nevertheless, have a pathology, now well understood. Progress in medicine has established the fact that other causes besides pathologic tissue changes may be the definite etiologic factors of disease. Applying this truism to gynecologic diseases it must be admitted that *certain anomalies of function* in the female genital apparatus are the direct or indirect result of disturbed internal secretory activity of the ovary or possibly of other glands of the endocrine system. But this advance of information still is limited only to *certain functional anomalies.* The rather widespread attempt to explain practically all gynecologic diseases, with the sole exception of those obviously due to infection or traumatism, on the basis of a hypofunction, hyperfunction or "dysfunction" of one or more of the endocrine glands is unjustifiable and unfortunate. *A gynecologic condition can and should be considered as the result or expression of anomalous internal secretion only after the most careful examination and study of the case has failed to reveal any other possible cause.*

1. Maldevelopment of Internal Genitals

Infantilism is now generally looked upon as the result of a disturbance in the endocrine system. This arrest of development may be noticeable in all parts of the body (universal infantilism) or be limited to certain parts (partial infantilism). Therefore, a *rudimentary, infantile* or *puerile* uterus often is found associated with other stigmas of infantilism, especially in the skeleton. If the maldevelopment is limited to the internal genitals, and the ovaries are small and atrophic, a deficiency in ovarian function commonly is suspected as its primary cause. It must be remembered, however, that this deficiency cannot properly be laid at the doors of the corpus luteum, since this structure obviously can exert its influence only after puberty has been established. In the prepuberal stage of development an internal secretion could be supplied by the ovary only through the interstitial gland. In a considerable number of these cases, however, the ovaries apparently are normal. Then the underdevelopment of the uterus necessarily is but a part of the "general hypoplastic condition." And it is this fact which raises the logical question whether in cases of infantile uterus with small ovaries also the hypoplastic ovaries are solely an incidental manifestation of the general hypoplasia.

In the opinion of some writers, enteroptosis, an abnormal mobility of all abdominal organs, is a stigma of infantilism, and, therefore, congenital; and developmental malpositions of the uterus (anteflexion, retroflexion, procidentia, etc.) only the indirect expression of a hypoplastic condition or the remote result of disturbed endocrine gland function.

Pronounced alterations especially in thyroid and pituitary function undeniably interfere with normal development of the genitals from birth to puberty, presumably as the result of suppression or insufficiency in the production of hormones which normally further growth (stimulate calcium retention according to Bell).

In the interpretation of the clinical finding of maldevelopment or malposition of the uterus it must not be forgotten that these anomalies may be caused also by local inflammatory processes (tubercular, gonorrheal or other infections) not uncommonly observed even in young girls.

2. Uterine Atrophy

Uterine atrophy is the result of retrograde changes (involution) in the fully developed uterus. It, therefore, must be the result of deficiency or complete disappearance of specific growth stimuli, which up to that time had been supplied in sufficient quantity to the uterus presumably by the cyclic formation of the corpus luteum. The uterus and, usually with it, the other parts of the entire genital system, including the breasts, become atrophic when ovulation ceases or when all ovarian tissue is removed (castration) or its function destroyed by the effect of radium or x-rays. In other words, progressive involution of the uterus in its final analysis is the result of the same etiologic factors which, outside of pregnancy, lead to gradual or complete suppression of ovulation, i.e., in its outward expression, to gradual or complete cessation of the menstrual flow. A more detailed discussion of these etiologic factors will be given in later paragraphs dealing with menstrual disturbances.

3. Delayed Puberty

Puberty is characterized by the full, i.e., normal development of both the primary and secondary sex characteristics (see Chapter XIV). These physical and mental signs of maturity are accompanied by the evidences of beginning reproductive activity—the appearance of the first menstrual flow induced by ovulation (corpus luteum function). Puberty, more exactly expressed, is reached when graafian follicles begin to pass through their complete cycle: maturation, rupture, discharge of ovum, formation of corpus luteum, change to corpus albicans, complete resorption. Thus the beginning of ovulation (puberty) at the proper age is dependent, rather indefinitely, upon some influences of race, climate, heredity, social condition, mental and sexual stimulation, etc., and more definitely, upon the general physical condition of the girl.

A poor physical condition is the most common obvious cause of delayed puberty. This gynecologic anomaly, therefore, relatively often is seen in poorly nourished, anemic and debilitated (as the result of the wasting diseases) girls.

In a small group of cases, however, late pubescence evidently is only part of general maldevelopment (infantilism), or is found associated with marked disease of one or more glands of the endocrine system. As one of the more common observations the delay of puberty in cretins may be cited. The inference seems permissible that in these patients a deficiency in thyroid secretion is responsible for a lack of hormones which are essential in the proper stimulation of the ovaries.

The theory (based upon the animal experiments of Klose and others) that the thymus has an inhibitory influence on ovarian function, and that, therefore, ovarian function cannot begin before thymus function is ended, has been greatly weakened by recent investigations.

4. Precocious Puberty

The beginning of ovarian function (puberty) at an unusually early age almost invariably is due to disease of endocrine organs.

Adrenal hypernephromata in children, more frequently observed in girls than in boys, are characterized by a precocious growth of the body generally, and of the sexual organs in particular. Also in cases of pineal tumors early sexual maturity has been pointed out by Marburg as one of the typical symptoms. McCord, however, has shown that literature contains records of many cases of pineal tumors which, though appearing before maturity, did not exhibit any signs of precocity.

A careful study of the recorded cases of precocious puberty in girls has convinced Bell that true feminine sexual precocity appears to be produced only by tumors or hyperplasia of the ovaries. Changes in the suprarenal cortex, pineal gland, and the pituitary, resembling those which in boys invariably produce precocity, in girls rather tend to produce the stigmas of masculinity.

5. Anomalies of the Menstrual Flow

The stimulus for the menstrual flow undeniably is supplied by the ovaries. In the absence of functionating ovarian tissue menstruation is impossible. The exact mechanism of the relation of the ovary to the menstrual flow seemingly is established by the discovery that corpus luteum secretion results in growth activity in the uterus, while regressive signs (necrosis and hemorrhage) characterize the cessation of corpus luteum secretion at each cycle. Granted this relation, logically two deductions seem justifiable: First, that the regularity of menstruation is dependent upon the regularity of ovulation; and secondly, that pathologic scarcity of menstrual flow, oligomenorrhea, will be the result of a deficient supply of stimulating hormones coming from the ovary (hypofunction), amenorrhea undeniably being the result of complete cessation of ovarian function.

Oligomenorrhea is commonly, and continued amenorrhea almost always, associated with a corresponding decrease in the size of the uterus. The explanation of this coincidence formerly was that the primary progressive atrophy of the uterus secondarily leads to the gradual reduction of the menstrual flow. In the light of present knowledge it seems more plausible that both phenomena are conjointly due to an increasing deficiency of internal secretory function of the ovary.

The common clinical experience that wasting diseases (such as tuberculosis, typhoid, etc.), even in the earlier stage, or the loss of important body fluids (e.g., prolonged suppuration, lactation, etc.) often lead to a lessening or entire suppression of menstruation, must be explained by a marked sensitiveness of the ovary to all severe disturbances of the general metabolism. This same explanation may hold true for identical changes in menstruation commonly observed in patients suffering from exophthalmic goiter, myxedema, acromegaly, Addison's disease, diabetes, etc. In some of these conditions, however, the characteristic symptom-complex is such as to suggest strongly that the evident functional disturbance in one endocrine gland directly affects the internal secretory activity of the ovary. The fact seems fairly well established that hypofunction of the pituitary after puberty is promptly followed by a marked tendency to general accumulation of fat typically associated with a decrease or cessation of the menstrual flow, a condition known as "dystrophia adiposogenitalis."

But it can easily be demonstrated that our general knowledge concerning such an interrelation still is most unsatisfactory. To cite a striking example: In cases of myxedema, i.e., in a condition of definite hypothyroidism, amenorrhea is rather the rule. On the other hand, it has been stated by Kocher that women, on whom too radical a goiter operation has been performed, will suffer from menorrhagia. This observation was typical enough to induce him to term the condition "menorrhagia thyreopriva." Thus thyroid deficiency apparently leads to both amenorrhea and menorrhagia, and in the same way both the evidences of ovarian hypofunction or hyperfunction may be seen in cases of definite hyperthyroidism (exophthalmic goiter).

In view of such striking discrepancy of opinions in regard to certain influences actuating ovarian hypofunction, we must, for the present, be content with the more definite conclusion that a decrease in ovarian function leads to a corresponding decrease in menstrual flow. This decrease may manifest itself in a scant flow of short duration or in a gradual lengthening of the intermenstrual interval. While the first phenomenon is entirely in harmony with the conception of ovarian function as now understood, the latter alteration of the regular menstrual cycle necessarily will remain obscure until we know more about the causes of that striking rhythmicity evident in other organ functions (heart, respiration, intestinal peristalsis, etc.).

6. **Metrorrhagia**

It is not justifiable, however to deduce in the inverse manner that an increase of internal secretory activity of the ovary necessarily accounts for every increase in the menstrual discharge. Menorrhagia and metrorrhagia might be dependent upon local conditions. This, indeed, heretofore has been the prevailing opinion. Textbooks still cite menorrhagia and metrorrhagia as the classical symptoms of endometritis, infectious processes in uterus or its adnexa, fibromyoma, or retroflexion. A radical change of these time-honored conceptions was forced upon the gynecologist chiefly by two discoveries, now firmly established by many expert investigators: (a) The histologic picture of the so-called glandular endometritis in fact only shows the endometrium in its premenstrual cycle; (b) Pathologic hemorrhages from the uterus are satisfactorily explained by histologic findings (evidences of ruptured or destroyed capillaries, blood vessels, etc.) only in cases of abortion, carcinoma, destructive processes in the uterus, and uterine polypi. This second fact evolved chiefly from the thorough study of a class of cases variously termed as chronic metritis, uterine apoplexy, uncontrollable metrorrhagia, myopathia hemorrhagica, etc. Before x-rays and radium were successfully employed in the treatment of these cases, hysterectomy often had to be resorted to as the only method of coping with the repeated and sometimes incessant loss of blood. In this manner much valuable material was obtained for careful histologic research in regard to the causes of pathologic uterine hemorrhages. An insufficient amount of musculature (uterine insufficiency), a pathologic increase in connective tissue (as the result of chronic inflammation), or a lack of the required amount of elastic tissue in the uterine wall (developmental defect), sclerotic changes in the blood vessels of the myometrium in turn were advanced as the etiologic lesions, because the endometrium itself in most of these uteri was found to be normal, often atrophic and only occasionally hyperplastic. But none of these findings in the myometrium was constant enough to prove acceptable as a truly satisfactory explanation for this type of hemorrhage. Coincidentally a better understanding had developed concerning the actual relation of ovarian function to the physiologic discharge of blood from the uterus (menstruation), and then logically the conviction began to gain ground that, if these abnormal uterine hemorrhages are not likely to be caused by tissue lesions either in myometrium or endometrium, they might, in all probability, be due to ovarian hyperactivity and thus represent the manifestation of uterine hyperstimulation. Of considerable weight in these conclusions concerning an interrelation of anomalous ovarian to anomalous uterine function, of necessity, proved the common observation that, almost typically, disturbances of menstruation coincide with the beginning (puberty) and the end (menopause) of ovarian functional activity. Here again a great deal of material, supplied for laboratory study by curettage, definitely established the fact that in these cases the endometrium usually is only slightly hyperplastic or actually normal.

Approximately in this manner the present rather prevalent view has developed that with but a few definite exceptions (abortion, destructive processes, uterine polypi) possibly all other abnormal uterine hemorrhages are due to ovarian hyperfunction. In cases of inflammatory and infectious processes, new growth, masturbation, etc., it is an active hyperemia; in cases of malposition, heart lesions, etc., a passive hyperemia of the ovaries which leads to the causative pathologic ovarian overstimulation.

Of late this theory has been greatly strengthened by the satisfactory and often excellent results obtained with the use of radium and x-rays. The fact is firmly established that these rays primarily affect the ovary. The beneficial effect of the rays, therefore, in the treatment of metrorrhagia (also in cases of fibroids) undeniably is obtained only indirectly by way of a reduced or entirely suppressed ovarian function.

A disturbance of ovarian function rather than a uterine pathology suggests itself as the immediate cause of the common disturbance of menstruation in patients suffering from disease of an endocrine gland. While there are evident exceptions to the rule, in general, in exophthalmic goiter, acromegaly, etc., the hyperfunction of the diseased gland at first is accompanied by menorrhagia or metrorrhagia, which gradually gives way to the evidences of ovarian hypofunction or complete cessation of all ovarian activity in form of oligomenorrhea or definite menopause with permanent atrophy of the uterus.

It seems most interesting and suggestive that also in patients to whom x-rays are administered for the purpose of obtaining a reduction or cessation of ovarian internal secretory activity, the final amenorrhea almost as a rule is preceded by a period of free and irregular hemorrhages.

7. Sterility

It is perfectly obvious that any condition which results in complete and permanent cessation of ovarian function (ovulation) necessarily must include sterility as one of its final sequelae.

The not uncommon symptom-complex: delayed puberty, dysmenorrhea, sterility, and uterus of infantile or puerile type, often is found in association with stigmas of general infantilism. This fact establishes another, though indirect, relation between the endocrine system and sterility. In these instances both the dysmenorrhea and sterility are more reasonably explained by mechanical obstacles offered for the passage of menstrual blood and spermatozoids by the long, narrow, and often sharply bent cervical canal which is typical of the underdeveloped uterus.

Clinical experience shows that some cases of supposed sterility with occasional long interval menstruations (six to seven weeks) actually represent peculiar instances of habitual abortions. In the light of the recognized fact that corpus luteum secretion is essential, not only for the process of nidation, but also for the early protection of the implanted ovum, a relation of habitual abortion, if not otherwise explained, to anomalous function of the corpus luteum might be suspected.

Reference must be made in this connection to the not unusual observation of impregnation in the course of a temporary state of amenorrhea. This apparently paradox occurrence can be explained in two ways: (a) A uterus which has become markedly atrophic as the result of continued cessation of ovulation, (e.g., during lactation) is anatomically unfit to react in form of a menstrual discharge to the growth stimulation of the first corpus luteum: or (b) The very first ovum discharge by the reestablished ovulation process becomes immediately fertilized. The endometrium sensitized by the first corpus luteum has no opportunity to break down but transforms into maternal placenta.

The claims made by some writers that also dysmenorrhea of the nonobstructive type and the molimina of early pregnancy are caused by hypofunction of the corpus luteum are entirely hypothetical. Certain facts (large size of corpus luteum, its acknowledged importance in the nidation process, etc.) rather indicate a state of hyperactivity early in pregnancy. On the other hand, e.g., in the cases of dysmenorrhea membranacea, the evident exaggeration of physiologic endometrial processes would more logically suggest ovarian hyperactivity than hypoactivity.

THERAPY

Though still decidedly limited in its scope, information at present available concerning the rôle played by functional disturbances of the ovary and other endocrine glands in the etiology of gynecologic anomalies, demands definite changes in our conception of the rationale of some of the methods of treatment customarily used in gynecologic practice.

a. *The therapeutic value of certain procedures becomes doubtful.* For instance: If the endometrium itself is not responsible for the virginal menorrhagia or the climacteric metrorrhagia, local applications of caustics or curettage must be considered improper procedures. Curettage under these conditions remains justifiable only if abortion or a uterine polypus is suspected, or if it seems desirable to study the endometrium histologically for diagnostic purposes (suspected malignancy, etc.). Everyday experience has amply demonstrated that only exceptionally permanent results are obtained even with repeated curettage in this type of uterine hemorrhage.

b. *The acknowledged effectiveness of certain therapeutic methods must be explained in a different manner.* For instance: Correction of a uterine malposition relieves an associated metrorrhagia, not by establishing better circulatory conditions in the uterus, but by eliminating a pathologic irritation of the ovaries existing as the result of pressure, or of pulling adhesions which incite the ovary to hyperfunction.

Hot douches, exercise, pelvic massage, an intrauterine stem pessary, etc., do not directly stimulate to further growth the small uterus, arrested in its full development, but probably only incite the ovary to an increased activity in supplying the deficient growth hormone to the uterus.

c. *It could be reasonably expected that a deficiency in ovarian hormones would be counteracted by the administration of ovarian extracts, or that ovarian function could be stimulated and retarded, respectively, by the administration of hormones extracted from certain other glands of the endocrine system.*

Within the scope of this chapter, devoted only to the internal secretion problem, a consideration of gynecologic therapy properly must be limited to a discussion of only those methods of treatment which are likely to stimulate the hypoactive, or to depress the hyperactive ovary. It has been shown in the preceding pages that the anomalies of development and function in the female genital tract, insofar as they depend upon anomalies of internal secretion, more directly are the result solely of disturbed ovarian function. The latter, both in its hypoactive and hyperactive form, is dependent upon either (a) a local pelvic pathology, (b) impaired general health, or (c) a disturbance in the normal, harmonious interaction of all the glands of the endocrine system as the result of the removal or anomalous function of one of the glands.

From this point of view it seems practicable to consider all therapeutic procedures available for combating ovarian hypofunction or hyperfunction under the following three headings:

1. Local Treatment of Pelvic Pathology

The typical symptoms of **hypofunction** (oligomenorrhea, long interval menstruation, amenorrhea) are rarely observed in association with acquired and noncongenital pelvic lesions. Even in extensive involvement of the ovaries by new growths, menstruation does not necessarily become scantier.

Much more commonly are seen the evidences of ovarian **hyperfunction,** especially in the presence of inflammatory processes, uterine malpositions, fibromyomata, etc. A menorrhagia or metrorrhagia in these conditions often appears as the one predominant symptom which necessitates interference. Outside of hysterectomy or bilateral oophorectomy its relief in general will be dependent upon the degree to which operative or conservative methods of treatment in the individual case succeed in eliminating further ovarian irritation, existing as the result of inflammation, infiltration, pressure, adhesions, pelvic congestion, etc. The value of curettage in this connection is limited to the removal of a hyperplastic endometrium which is likely to be restored in a histologically more normal form only, if coincidentally ovarian hyperactivity is effectively combated by other therapeutic measures.

In most instances of ovarian hyperactivity a complete cessation of all function can be obtained by the use of radium and x-rays. The expert with proper equipment often will succeed by means of these rays to reduce the abnormally increased function exactly to the extent as to render it normal.

Literature contains records of satisfactory cures after partial resection of small cystic degenerated ovaries in instances of abnormal uterine bleeding, apparently not caused by any recognizable uterine lesions. The theory of a relation of small cystic degeneration to ovarian hyperfunction, based upon a few clinical observations of this sort, is entirely too problematic to justify a recommendation of ovarian resection as an appropriate therapeutic procedure in cases of so-called "functional" menorrhagia or metrorrhagia.

2. Constitutional Treatment

A secondary ovarian **hypofunction** is so evidently associated with impaired general health that but little need be said concerning the advantages of general dietetic, hygienic and tonic measures in the treatment of oligomenorrhea or temporary amenorrhea. A reduction or suppression of the menstrual flow often appears as one of the first manifest symptoms of serious disease, and it, therefore, should be the rule for every physician, when confronted with this symptom, to search carefully for tuberculosis, syphilis, diabetes, nephritis, etc. Improvement in the general condition of these patients invariably will correct the disturbed menstrual function.

The signs of ovarian **hyperfunction** in cases of cardiac lesions, usually disappear promptly when compensation is restored, and circulatory conditions in the pelvis become normal.

Evidences of ovarian hyperfunction coincident with impaired general health are commonly seen in the earlier stages of disease of endocrine glands. They do not require special treatment because, as a rule, they gradually disappear, giving way to the signs of ovarian hypofunction.

3. Organotherapy

Indiscriminate and overenthusiastic practical application of facts, laboriously ascertained in the laboratory or at the postmortem table, is likely to discredit scientific research. Far-reaching and usually incorrect deductions are often drawn by clinicians who consider the specific efficacy of a certain remedy as established, because in a number of instances its administration is followed by apparent improvement of the patient's condition. Many of the erroneous theories and attractive hypotheses thus promulgated by clinicians, require many years of most exact and complex laboratory study to establish their fallacy, and to reinstate scientific truth, carelessly and unwittingly obscured by them. This occurrence is well known to the student of the history of medicine. Once again one can easily recognize this phenomenon by comparing the literature presented by physiologists and biochemists concerning internal secretions, with the numberless articles recording in medical journals the satisfactory and often marvelous results of organotherapy.

The waste of the slaughterhouse of yesterday, today has become one of the most valuable by-products of the packing industry. Packing houses of this country produce and advertise, extensively and most extravagantly, the various organotherapeutic preparations. They follow the accepted standards of successful advertising. The profession, it would seem, falls an easy victim to their exaggerated claims.

The fact is scientifically established that certain organs, by an internal secretion, produce potent biochemic agents. The conclusion is logical, and well corroborated by some scientific evidence, that the introduction of these agents into the organism will alleviate or fully counterbalance the effects of a deficiency or complete absence of such substances.

The practical realization of such an ideal type of specific medication, however, necessarily must be dependent upon a few essential requirements. The administered substance must be chemically and biologically identical with the one that is missing and therefore must be replaced. In case of deficient organ function the administered substance must contain *all* the hormones normally supplied by this organ. It must be available in a chemically pure form, and in a standardized strength to permit exact dosage.

If we compare these essential requirements of organotherapy with the actual facts, we find: Only adrenalin so far has been isolated in pure form. Adrenalin, however, represents only one, quickly acting, hormone, supplied by the adrenal cortex and surely does not replace all functional activity of this organ. In a similar way pituitrin, pituitary extract, etc., contain only a promptly acting hormone with a purely local effect, extracted from the posterior lobe of the pituitary body. Only of certain products prepared from the thyroid we know definitely that they can counteract successfully all the symptoms due to deficient activity of this organ.

Considering in particular the various ovarian preparations, at present advocated and marketed, we must remember the still unsolved question whether the potent substances are supplied by the interstitial glands, or the follicle apparatus, or particularly by the corpus luteum. The recommendations made by the various writers vary between the administration in form of the dried powder of the entire ovary, of corpus luteum alone, or of ovarian substance from which all corpus luteum tissue had been removed. There is great divergence of opinions as to the comparative efficacy of all these preparations, whether made from the ovaries of pregnant or of nonpregnant animals, or whether the material is obtained from cows, pigs, or sheep, etc.

From a practical point of view the problem of ovarian preparations becomes still more complex because many of the commercial preparations are supposed to supply the isolated active principles in form of an extract. Some of these extracts are aqueous, others alcoholic or ethereal. Painstaking laboratory investigations as yet have not solved the problem of successful extraction of all the active substances of endocrine glands. Preparations as furnished to the physician, as a rule, do not indicate this particular feature of their production. It cannot be surprising, therefore, that medical literature reveals a striking dissension of views concerning the particular effectiveness of the one or the other remedy. It, furthermore, is obvious that these preparations are not employed in any known dosage because they are not and cannot be standardized. Easily comparable to the common practice of the patent medicine manufacturer of former days, the strength of such extracts often is changed without proper announcement to the profession. This practice is reprehensible and distinctly dangerous, at least in the case of such potent extracts as those obtained from the posterior lobe of the pituitary. There cannot be any doubt that a uterine rupture during labor occasionally has been caused unwittingly by a physician who did not know that the extract of the one manufacturer is made from double the amount of tissue of that used by another; or that the same concern now is furnishing a so-called 20 per cent solution instead of the former 10 per cent solution without indicating this change on the label of the ampoule in which the preparation is marketed.

Organotherapy in its present status of development obviously does not comply with the demands enumerated above, which are essential for the realization of the ideal of specific therapy.

Appreciating these facts one cannot be surprised to read what Robert T. Frank, a recognized experimenter, only recently wrote: "Little, if any, advance in organotherapy is to be recorded in the last years. The normal number of reports on the use of corpus luteum extracts have appeared in the literature. All those commercial extracts these were the extracts which were employed in the clinical articles reported which the writer has examined have proved inactive biologically, using the growth effect exerted on the rabbit uterus as a test. No further reports on the general pharmacologic activity of corpus luteum are on hand."

The pessimistic attitude evidenced in these preceding pages concerning organotherapy, as advocated and practiced today, must not be misinterpreted. Certain definite and good results in the treatment of gynecologic disturbances, particularly with the ovarian extracts, cannot be denied; but the practitioner, and especially the student of medicine, must be warned emphatically against the common suggestion that the commercial preparations actually replace substances missing in the organism as the result of deficient secretory activity of the ovary or other endocrine glands.

Specific diagnostic reactions and specific therapeutic remedies always have been the ideal desiderata of clinical medicine. These ideals so far have not been realized in the case of gynecologic organotherapy. Koehler (Zentralbl. f. Gynäk, 1915), treated three series of cases of amenorrhea: The first with extract of ovary and corpus luteum, the second with extract of hypophysis on account of its supposed stimulating effect on the ovary, and the third series with enteroglandol, an extract prepared from the small intestines, which hardly could be expected to have any specific effect on the ovary. The results obtained in all three groups were approximately the same. Such tests, and they have been made in a similar manner in other gynecologic anomalies, must raise serious doubt concerning the specificity of such organ extracts. Are we not going through the same disappointment in organotherapy that we have but recently experienced with the supposedly specific vaccine therapy of Wright, or the specific reactions for certain enzymes devised by Abderhalden? The action of these organ extracts, if they prove effective at all, more likely might be due to some chemical combinations contained in organ extracts in general, which possibly belong in the group of the amines (Koehler).

After this consideration of the pharmacologic aspect of organotherapeutic remedies in general it will be comparatively simple to present a few details concerning commercial products available for the treatment of gynecologic diseases or anomalies.

Ovarian Preparations.—Desiccated powder of ovarian tissue (entire gland), or of corpus luteum alone. Ovarian extracts in liquid form, or in compressed tablets. Corpus luteum extract in liquid form for hypodermic use, etc.

The desiccated powders must be fresh and kept in a cool place because they are subject to decomposition. They can be prescribed in any desired doses and usually are given in gelatine capsules on account of their disagreeable taste and, particularly, odor. It seems that as a whole they prove more effective than the compressed tablets. When given by mouth, the potency of such organic substances may be seriously impaired on their way through the gastrointestinal tract through the influence of digestion. Their pharmacologic effect obviously is dependent upon the degree to which they are actually resorbed into the blood in chemically unchanged form.

The liquid preparations for hypodermic use in this respect offer an advantage, which in practice, however, seems more than counteracted by the fact that as "extracts" they probably do not contain all the active substances of the gland, as the entire organ in pulverized form is more likely to do.

It seems almost the routine to give the various preparations by mouth in five-grain doses three times a day, and hypodermic injections of the standard one cubic centimeter ampoules every other or third day. There are no dangerous results known of overdoses, though patients occasionally will complain of gastric discomfort or headache.

All ovarian preparations still are used rather indiscriminately in practically all gynecologic anomalies. Literature undeniably contains many records of satisfactory and brilliant results. But if we could trust these reports, corpus luteum will successfully increase the menstrual flow in cases of oligomenorrhea with the same certainty with which it reduces, in the experience of other reporters, the profuse bleeding to a normal flow in cases of menorrhagia. According to literature corpus luteum proves equally effective in starting menstruation in the amenorrheic girl and in stopping metrorrhagia near the menopause. The literature is contradictory and bewildering, because most of the reports are based on inexact clinical observations made on a small number of cases.

All that can be said definitely concerning the therapeutic value of ovarian preparations is the following: Powder of the fresh desiccated, entire ovary seems the most effective of the various commercial products. Ovarian preparations prove most valuable for the relief of certain symptoms associated both with the natural and artificial menopause, chiefly those evidenced in a disturbed vasomotor function (hot flushes, attacks of profuse sweating, cold extremities, palpitations, etc.) and also in certain psychic phenomena which often indirectly are dependent upon these circulatory disturbances. In cases of kraurosis vulvae, a circulatory-trophic affection of the vulvar skin, the annoying itching occasionally is greatly relieved by ovarian preparations. The good results sometimes obtained in cases of amenorrhea and oligomenorrhea are not convincing, since in these patients, organotherapy usually is combined, as it should be, with general hygienic-dietetic treatment. In many instances in which striking improvement promptly follows the administration of ovarian substance, the beneficial effect of strong suggestion should not be underestimated. Such unusual remedies hardly ever are given to patients without a great deal of explanation regarding their peculiar *modus operandi* and their probable effect. Every experienced gynecologist knows that gynecologic patients are exceptionally susceptible to suggestion of every kind.

The hope is justified that further improvement in the methods of the preparation of ovarian extracts especially in form of a stable extract of the lipoid substances will ultimately lead to a corresponding improvement in the results obtained with their administration.

Thyroid Gland Preparations.—It has been stated above that of all the commercial organotherapeutic remedies only the thyroid extract actually can replace the deficient or absent gland secretions. The use of this extract, therefore, is clearly indicated in all instances of functional anomalies of the female genital apparatus which evidently are due to hypothyroidism. Unfortunately, however, as mentioned in preceding pages, hypothyroidism may cause amenorrhea, e.g., in cases of myxedema, and, on the other hand, may result in profuse menorrhagia, e.g., after too radical thyroidectomy. Therefore, both amenorrhea and metrorrhagia can be properly treated with thyroid extract if by a test of the basic metabolism first the fact is definitely established that the underlying cause is a true deficiency in thyroid secretions. This may well serve as a good illustration of the intricacy of discriminative organotherapy and the absolute necessity of exact diagnosis.

Pituitary Gland Preparations.—Extracts prepared from the *posterior lobe* contain a quickly acting hormone which exerts a specific stimulating effect on smooth musculature. In gynecologic practice they are employed after operations to overcome paretic conditions of the bladder or intestines. In cases of unavoidable or incomplete abortion administration of the extract in small doses, given in intervals of from one to two hours, occasionally effects the complete expulsion of the uterine contents and then stops the uterine hemorrhage, thus obviating operative interference.

Extracts of the *anterior lobe* will sometimes benefit clinical states dependent upon primary pituitary disease, showing sexual disturbances in form of irregular menstruation, amenorrhea, or sterility. In such cases, according to some reports, after the use of anterior lobe extract menstruation and sexual libido have returned even when they had been absent for considerable time. Of late the suggestion has been made by various writers to combine the extract of the anterior lobe or of the entire pituitary gland with ovarian extract and also with thyroid extract in cases of genital aplasia, especially when associated with general adiposity (dystrophia adiposogenitalis).

Pancreas Preparations.—Functional disturbances in the genital sphere are not uncommonly seen in diabetic women. This combination might be only accidental, or in some instances seems due to a disturbance of the normal endocrine gland interaction. These cases at the present time are not amenable to organotherapeutic efforts. According to the positive statement of Carlson there does not exist any proof that any extract of the pancreas so far prepared has increased the power of a diabetic animal or patient to oxidize sugar.

Mammary Gland Preparations.—There has never been any evidence adduced that the mammary gland is an organ possessed of an internal secretion. Nevertheless we find in literature records of good results obtained with mammary extracts in uterine hemorrhages. In view of the fact that there are so many drugs available, which are decidedly more reliable in the relief of this condition, it does not seem justifiable to advocate the use of a remedy of such doubtful value in the treatment of pathologic uterine bleeding.

CHAPTER XVI

OTHER ORGANS IN RELATION TO GYNECOLOGY

The organs of the body are bound together by three ties—the nervous system, the blood and lymph circulation, and the internal secretions. Concerning each of these ties much remains unknown, but enough is known to make clear that whatever affects one organ seriously must affect all to some extent.

The nature and extent of these binding influences form most interesting subjects for investigation. Much information has been acquired as to the relation of other organs to the genital system. It has been known from time immemorial that menstruation had some influence on various extragenital organs. Gradually it became apparent that these obscure, isolated, rather erratic phenomena were simply the more pronounced manifestations of a widespread and profound influence affecting the whole metabolism and all the life processes. The menstrual flow thus became the outward manifestation of definite inner changes affecting vital functions generally. Jacobi made this articulate in the Wave Theory of menstruation (Bolyston Prize Essay, Harvard University, 1876) and Ott expressed it graphically in his classical curve chart (Fig. 925) (Zentralblatt für Gynäkologie, 1890).

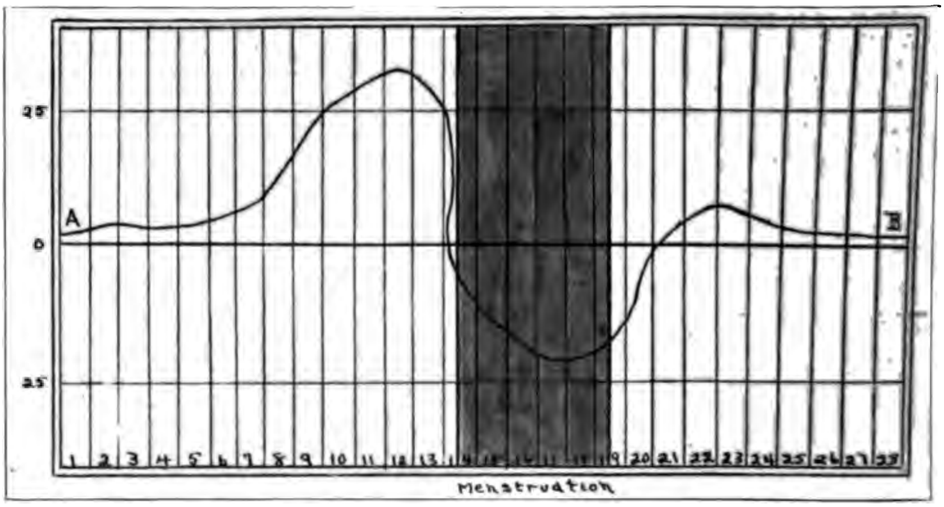


Fig. 925.—Curve of Ott. A graphic representation of the periodic menstrual variation in general functional activity. (Graves—*Gynecology*.)

This subject of the interrelation of the genital system with other organs presents so many interesting questions and such an accumulation of clinical and experimental data that one is tempted to an extended discussion. But there is space here only for those items of relationship that have a definite bearing on gynecological pathology, diagnosis or treatment. The relations of the important endocrine system to gynecology have been fully considered in the preceding chapter. In adding a chapter for the consideration of the relations of the various other organs, the author gratefully acknowledges the influence of Graves, who has given special attention to this subject and discusses it most thoroughly and helpfully in his excellent textbook.

DIGESTIVE SYSTEM

In the **mouth** the general hyperemia of the menstrual period is manifested by increased salivary activity, sometimes troublesome, and occasionally by bleeding from the gums or other portions of the oral mucosa.

The **stomach** shows a premenstrual secretory and motor activity, supposed to be due to the general stimulation of the endocrine glands, followed by a depression. Nausea, indigestion, and vomiting occur frequently, but usually subside as the flow is well established. Occasionally there is increased hunger or, again, aversion to certain articles of food. Constipation is a common accompaniment of menstruation, diarrhea being less common. These functional disturbances are ordinarily mild and transitory. If they are severe or prolonged, search should be made for a lesion of the stomach or other portion of the gastrointestinal tract. Lesions of the stomach show aggravation of symptoms at menstruation, and an ulcer is more likely to bleed at that time.

The **small intestine** and the tributory **liver** and **pancreas** participate in the general variations of function at menstruation, and also in the upset experienced in stomach and intestinal function from pelvic lesions.

The **colon**, with its appendages, is of still more interest in connection with gynecology. Mucous colitis, diverticulitis, and new growths (especially of cecum and sigmoid), are very frequently mistaken for genital lesions or associated with such leisons. The **appendix** is so closely associated with the pelvic structures that its condition must be considered in every right-sided disturbance. Much has been written upon the gynecologic significance of appendicitis, its relation to oophoritis and salpingitis, and the mistakes in diagnosis associated with it. One form in particular has frequently escaped detection for a long time. It is that very mild appendicitis which gives symptoms only during the menstrual congestion, with no disturbance in the interval. The patient complains only of menstrual pain—appendiceal dysmenorrhea.

Intestinal stasis, from enteroptosis or intraperitoneal bands or kinking or pocketing, has an important bearing on gynecologic diagnosis and treatment. When associated with a pelvic lesion, its depression of the patient's nutrition modifies the symptoms greatly and may lead to an erroneous diagnosis. Likewise if unrecognized and uncorrected it interferes with the results of treatment, operative or otherwise.

The **peritoneal cavity** as a whole must be studied by the gynecologist. The pelvic peritoneum is a part of it, and partakes of the physiology and pathology of the whole. On account of the location of the pelvic cavity, gravity is likely to carry to it infections from above. Ordinary pus infection, tuberculosis and tumor cells, all tend to gravitate to the pelvis. Also, by continuity of tissue, growths from other parts of the cavity extend to the pelvic organs, and vice versa. Intraperitoneal bands and membranes, tumors of the mesentery and retroperitoneal structures, and displaced abdominal organs must all be taken into consideration in pelvic diagnosis. Displacement of the abdominal organs to the pelvis, especially of the kidneys and spleen, have caused serious mistakes in diagnosis and in operation. Peterson (Am. Jour. Obst. and Gynec., November, 1920) presents an instructive collection of such cases.

The **rectum** partakes of the menstrual hyperemia, with the resulting irritation and hemorrhagic tendency. Constipation is more likely to cause local trouble then than at other times, hence measures should be taken to avoid it. Hemorrhoids and ulcers bleed more and there is an aggravation of the other rectal lesions such as proctitis and pruritus ani. In pelvic diagnosis the possibility of a rectal lesion must always be kept in mind. Symptoms due to rectal disease are often mistakenly attributed to some genital lesion. On account of this close association, rectal examination is indicated in nearly all gynecological patients, and in many an extended rectal investigation is required. Also, rectoabdominal examination often gives additional information in regard to the genital organs.

RESPIRATORY SYSTEM

The marked changes in the larynx and the voice along with the development of the genital organs, emphasizes the relationship of the two systems. Menstrual variations in the voice and in the susceptibility to laryngeal and pulmonary inflammation have been noted. The menstrual hemorrhagic tendency is seen in laryngeal and pulmonary lesions, that being a favorite time for hemoptysis. From the respiratory tract may come, also, bleeding in vicarious menstruation, though a careful search must be made for a lesion before any bleeding is so classified.

Bronchitis and pneumonia are important postoperative complications in gynecologic cases.

On the other hand, pulmonary lesions exercise a marked influence on the functions of the genital organs. Amenorrhea is frequently due to pulmonary tuberculosis and this disease must be searched for in every obscure case. Constant coughing may lead to pelvic congestion and menorrhagia or to prolapse of the pelvic organs. Pelvic tuberculosis originates from the lungs in a very large proportion of the cases, as does also pneumococcus suppuration in the pelvis.

CIRCULATORY SYSTEM

A certain form of degeneration of the **heart** muscle is very frequently found in association with uterine myomata, and is an important cause of sudden death in these patients while undergoing operation. So close does the association seem to be between uterine tumor and this heart degeneration that the latter has come to be referred to as "myoma heart." It is further considered under the pathology of uterine myoma (Chapter VIII).

A functional disturbance of the blood **vessels** associated with the genital organs is seen in the troublesome vasomotor phenomena of the menopause, due to diminished ovarian activity. The blood vessels also are affected in the thrombophlebitis occasionally seen following gynecologic operations (see Chapter XVIII). The list of blood-vessel disturbances includes also embolism from the pelvis, and varicose veins of the external genitals and of the broad ligaments.

The **blood** presents many variations associated with gynecologic conditions. **Leucocytosis** is of first importance. There is a moderate premenstrual increase in the leucocytes, corresponding with the height of the Ott curve, which disappears as the flow is established. Pelvic inflammations, of course, cause leucocytosis, the same as inflammations elsewhere. Hemorrhage into the pelvis, so frequently seen in the form of ruptured tubal pregnancy, causes marked leucocytosis, which persists during rapid absorption of the effused blood. As encapsulation of the area takes place the leucocytosis disappears. Of course, it may be prolonged and increased by infection of the blood mass. Leucocytosis appears also from the absorption of necrotic tissue and in the first three or four days of wound healing.

Of value, also, in gynecology are the various blood tests, such as the Wassermann test and the tuberculin reaction. In addition there are two conditions of the blood of special importance in women. One is chlorosis—that form of anemia characterized by a deficiency of hemoglobin out of proportion to the red count. It is seen particularly in girls at puberty, and is so frequently associated with latent tuberculosis that its presence should always start a search for that insidious disease. The second blood-condition referred to is hemophilia, which increases the hazard of puberty (with its onset of menstruation) and of gynecologic operations.

The nonclotting characteristic of the blood of the menstrual flow is due to something in the uterus and not to any special condition of the blood in general at that time.

URINARY SYSTEM

The proximity of the **bladder** indicates its close association with the physiologic and pathologic changes of the genital organs. Inflammations, displacements, and new growths in each system are reflected more or less in the symptomatology of the other, so much so that bladder conditions are often mistaken for genital lesions and genital lesions for bladder affections. It is clear then that a knowledge of the bladder condition is necessary in practically all gynecologic patients. If this is normal it will be indicated by the history, the urinalysis, and the bimanual palpation of the bladder. Further investigation, not only of the bladder but of the **ureters** and kidney-pelves as well, is often indicated by persistent symptoms that may be due to disease of these structures. Inflammatory lesions and tumors of the bladder, stone in the ureter and stricture of the ureter, or pyelitis and hydronephrosis may present symptoms leading to a mistaken diagnosis of genital disease. Still more troublesome in regard to diagnosis are the cases of associated lesions—one or more in each tract—requiring careful differentiation by an extended investigation of both tracts.

The integrity of **kidney function**, for its own sake and as a test of vital resistance, is an important pre-operation and post-operation question. The advances in the determination of kidney function and in our knowledge of how to improve the function, have added much to the safety of serious gynecologic operations.

MUSCULAR SYSTEM AND BONES AND JOINTS

The muscular system partakes of the premenstrual increase and menstrual decline in function. **Strains** of the lumbar muscles, due to faulty posture or special work as well as muscular "rheumatism," may cause symptoms supposedly due to intrapelvic disease. The undue use of certain deep muscles, as in running a sewing machine or walking up and down stairs or sweeping, may aggravate adjacent genital lesions.

The **backaches** commonly attributed to disease of uterus and adnexa are often due to disease of the sacral bones and joints, as explained under gynecologic examination (Chapter I) and gynecologic diagnosis (Chapter II). Coccygodinia is a very persistent and troublesome example, due to disease of the coccygococcygeal joint or adjacent nerves.

Another relation of the genital organs to the bones and joints is seen in "focal" infections, that is, foci of infection in the genital tract that give rise to distant joint-inflammations. The importance of this is just beginning to be appreciated since Rosenow's important work in the selective localization of infections. Langstroth (Am. Jour. Obst. and Gynec., July, 1921), among others, has called attention to this danger from cervical inflammatory foci.

SKIN

Herpes in various situations, urticaria, eczema, acne, furunculosis, all occurring particularly at the menstrual period testify to the relation between the genital organs and the skin. Pruritus in different situations is often aggravated by menstruation and by pelvic lesions. Pigmentation in the form of chloasma is another skin disturbance often associated with variations in genital functions.

Bleeding from certain areas of the skin and from mucous membranes is often seen in cases of disturbed menstruation. So often is it associated with amenorrhea that it is designated "vicarious menstruation" (see Chapter XIV).

ACUTE INFECTIOUS DISEASES

In some cases these have a marked influence on the genital organs. Aside from transitory menstrual disturbances, serious pelvic lesions may result from the localization of metastic infections in this region. **Influenza** and pneumonia are particularly prone to cause such troubles. It must be remembered also that scarlet fever or diphtheria in childhood may lead to inflammation and ulceration of the vagina, resulting later in various grades of atresia. Also, mumps and measles may cause ovarian inflammation, with more or less permanent damage to the organs involved.

ORGANS OF SPECIAL SENSE

The nose particularly is closely connected with the functioning of the genital organs. Menstrual irritation is frequent, and persistent bleeding from the nose is one of the most common forms of "vicarious menstruation." Certain areas in the nose are called "genital" or "erogenous" areas because there seems to be such a close connection between them and the genital tract. In certain cases of dysmenorrhea the pain is promptly relieved by cocainizing these areas, and is permanently relieved by cauterizing the areas (see Dysmenorrhea, Chapter XIV).

The eye and the ear present the usual menstrual tendency to irritation and hemorrhage. Functional and organic disturbances of the genital organs may be accompanied with congestion or inflammation of the eye or of the ear, or with functional disturbances due to defective nerve action and to secondary anemia.

NERVOUS SYSTEM

The intimate relation with the nervous system and with the mental processes and attitudes is seen all through the development and adult functioning and decline of the genital organs. As in the case of other important groups of organs, the interaction is reciprocal—abnormal conditions of the genital organs disturbing the nervous system to a greater or less extent, and nervous and mental diseases exercising a marked influence upon the genital functions. In regard to the modes of interaction or the avenues of transmission of these binding influences, there has been a decided change of conception. These reciprocal influences were formerly lumped together as "reflex," and were all supposed to be due to impulses transmitted along the nerve tracts. Now we know that many of the most important manifestations of this binding influence are due to various internal secretions carried by the blood stream. So important have these internal secretions become that a special chapter is devoted to the subject (Chapter XV).

Nervous disturbance and mental impressions have a marked influence on menstruation. The flow may be stopped temporarily or for a long period by fright, anger, disappointment and other strong emotions, or even by a change of environment as when beginning a new occupation or going away to school or making an ocean trip. Less frequently a bloody flow may be brought on by a nervous shock or excitation. This effect, though infrequent generally, is quite constant in some individuals. On the other hand, decided effects from menstruation are reflected in the nervous system, in the increased irritability and moodiness, and tendency to depression at that time. The same story is told by the more serious manifestation of instability. Records show that arrests for quarreling and other forms of violence, suicides and outbursts of insanity, are all more frequent at the menstrual time. This tendency is aggravated by abnormal conditions of the pelvic organs.

The physiologic development of the sex impulse along with other attributes of the nervous system is an important study. Whether or not one accepts the theories and teachings of Freud and his pupils at their face value, a study of these along with other viewpoints is incumbent upon those who deal with genital problems. In the development of the functions of the nervous system and of the genital system, is found the key to many deviations from normal that exercise such a profound influence upon the life-activities of the individual. At each extremity of the period of genital activity there is considerable temporary nervous instability due to changing conditions. At the menopause this is manifested by hot flushes, cardiac palpitation, dizziness, neuralgia and periods of depression. These phenomena were formerly supposed to be of purely nervous origin but now we know that they are due to the lessening of ovarian internal secretion, and, knowing this, we may give appropriate treatment if they become very troublesome.

An important diagnostic and therapeutic problem is presented in the handling of patients who have both neurologic and gynecologic disturbances. The diagnostic feature is considered in Chapter I under "Examination of the Nervous System in Gynecologic Cases," and is further elucidated in the remarks below. The selection of treatment in these nervous patients with pelvic symptoms turns on the estimation of the relative importance of each of the two factors in the situation. The problem of whether gynecologic treatment or neurologic treatment should assume primary place in such mixed cases was discussed by the author by invitation before the New York State Medical Society, and the following résumé is taken largely from that paper (Gynecologic Surgery in Hystero-Neurasthenic Patients, New York State Jour. of Med., Sept., 1916).

If gynecologic treatment be selected, it may be operative or nonoperative, in some cases one being preferable and in some cases the other. To simplify and facilitate consideration of the problem, operation may be taken to represent for the moment gynecologic treatment in general. In the case of each **nervous patient** presenting **pelvic symptoms**, three questions arise in connection with possible operative treatment:

I. Is operation indicated?

II. If indicated, what is the preferable time for the operation—before or after the course of neurologic treatment?

III. When operating, should *more* conservatism or *less* conservatism be practiced than in an individual with a normal nervous system?

Perhaps the best way to bring out the points clearly is for the author to state briefly his own convictions and practice, with the reasons therefor. Only principles may be given, the space being too limited to cite cases or even to consider principles in full detail.

I. Is operation indicated?

There are certain classes of cases in which operation is indicated without question, for example, those cases in which the pelvic lesion is seriously depressing the general health, through blood-loss or sepsis or local pain clearly due to the lesion. In such cases the lesion should, of course, be removed, irrespective of the co-existing nervous disease.

There are other cases, however, in which the connection between the pelvic lesion and the serious symptoms is not so clear. These doubtful cases may be grouped into two classes. One class (a) is composed of those cases in which the principal symptom is pelvic pain, constant or periodic, without a palpable local lesion of sufficient extent to satisfactorily account for the pain. The other class (b) includes those cases in which the principal symptoms are extra-pelvic but are supposed to be dependent, in whole or in part, on some intra-pelvic lesion.

The author knows of no easy road to a decision in these doubtful cases. Each case must be carefully studied, taking into consideration the history of the trouble, the pelvic findings, the extra-pelvic findings and the effect of treatment. Experience with the different types of cases is, of course, of great importance, but even that may fail to guide unerringly. There is such a marked individuality in these patients that the same treatment in seemingly identical cases may produce wholly different results. The treatment is to some extent tentative and, as far as the individual patient is concerned, experimental. Consequently, it is well to be conservative, beginning with the least severe measures which may bring success, and advancing to the more radical measures as such advance is justified by the failure of the previous treatment.

With this preliminary orientation, let us now consider some details in the handling of the two classes of doubtful cases.

a. Localized pelvic pain without palpable lesion to account for it.

Pain in any part of the pelvis may be due to several different causes and the various causes must be traced down as far as practicable in each case. For example, pain across the sacrum may be due to a new growth, to an inflammatory mass in the pelvis, to functional or postural congestion in the pelvis, to dragging of the pelvic organs on their supports, to sacroiliac disease, to rheumatism, to neuritis, to neuralgia, to faulty balance, or to a sprain or bruise. Likewise, in other portions of the pelvis, pain may be due to a variety of causes. The physician must determine as far as practicable what cause is operative in the patient before him.

To narrow the inquiry, so as to come at once to the important features, let us take, for example, pain that is localized definitely in the ovary. This is a form in which the problem is very frequently presented to the gynecologist and it may well be taken as a type of the class of cases now being considered. The ovary on the affected side is hypersensitive on palpation. There may or may not be fixation. There may or may not be enlargement. But the palpable changes, if any, in the ovary are not sufficient to wholly account for the pain. That is, they are no more than are often found in patients without particular pain. The definitely localized ovarian pain may be constant or periodic. Usually it is periodic and occurs at the menstrual time. I refer not to ordinary obstructive or congestive dysmenorrhea, but to an intense pain definitely localized in the ovary of one side and of such character and duration that the patient is completely undone by it and can scarcely recover from an attack before another one comes.

In deciding the question of operation in such a case we must consider the possible factors in the causation of the pain and the relative importance of each in the particular patient. There may be a definite pathological process in the ovary, the most common being a chronic nutritive disturbance, leading to cellular infiltration and contraction and cystic formation. There may be a general neurasthenic condition and hypersensitiveness of nerves, this being simply more marked about the affected ovary than elsewhere. The pain may be a local manifestation of well marked hysteria. There may be a definite neuritis, such as is found elsewhere in some cases of persistent pain. If the patient is markedly neurasthenic, so much so that the pelvic pain is a matter of secondary importance in the clinical picture, operation is contraindicated until the treatment for neurasthenia has been given a thorough trial. Likewise, if the patient is a marked hysteric, the presumption is that the pelvic pain is simply an hysterical manifestation, and treatment accordingly is indicated. On the other hand, if the patient presents no more instability of the nervous system than might be accounted for by the pain, which has constantly recurred in spite of ordinary measures (rest, local heat, laxatives, sedatives and perhaps x-ray treatment), then operation for removal of the affected ovary and exploration of the pelvis is indicated. Again, in a marked neurasthenic or hysteric, if a prolonged course of treatment in competent hands fails to give relief from the serious pelvic pain, operation is indicated.

b. Extra-pelvic symptoms supposed to be dependent, in whole or in part, on some intra-pelvic lesion. The decision as to what extent a pelvic lesion may be held responsible for extra-pelvic symptoms present in a given case, will depend to a considerable extent on the physician's views in regard to "reflex symptoms" in general and "pelvic reflexes" in particular. The author's view of the matter, and the rule that guides him as to the choice of operative treatment in these cases, is as follows:

The removal of the pelvic lesion will relieve the general nervous disturbance only insofar as that nervous disturbance is due to malnutrition or to general irritation of the nervous system dependent on the local lesion. That is, the author is not ready to admit any specific influence by way of the nerves, of a pelvic lesion over a like lesion in any other of the deep-seated organs. Investigations have shown that many of the organs of the body give into the blood specific substances having definite general and local effects, and the ovary belongs to this group. But this product is physiological and not due to a lesion. Furthermore, it is carried by the blood and not by way of the nerves. Consequently, when asked how far the removal of a pelvic lesion will benefit a patient with some general nervous disease, the author replies, "As far as that removal will improve nutrition and allay general irritation." That is as far as we can safely go in these cases at present. It is a fact that in some cases the results from operation apparently go beyond this, and we may hope for these added results. But they are erratic, unreliable, obtained in some cases and not in others, and we cannot justly hold them out as an indication for operation.

II. When operation is indicated, what is the preferable time for it—before or after the course of neurologic treatment?

In those cases in which it is evident that operation will be necessary sooner or later, the preferable plan usually is to do the operation first. The neurologic treatment may be begun shortly after the operation and continued during the patient's convalescence in the hospital. The stay in the hospital is to be prolonged as needed to give the patient a good start so that the treatment may be continued effectively at home.

If the pelvic lesion is of such character that its influence in the causation of the troublesome symptoms is very questionable, then the course of neurologic treatment should come first. In such a case, the course of neurologic treatment, in competent hands, may relieve the patient of all serious symptoms, thus rendering operation unnecessary.

In this connection, the author wishes to emphasize the phrase "in competent hands." According to his observation, a large part of the treatment employed for nervous disturbances in women is wholly inadequate. It scarcely touches the margin of the serious problem of relieving the patient of her disability. In many cases the physician seems to feel that a diagnosis of neurasthenia and especially of hysteria, relieves him of nearly all therapeutic responsibility. His view of the matter seems to be that the trouble being "nervous," the patient is somehow responsible for it and can cure it herself if she will. As a matter of fact, an established diagnosis of neurasthenia or hysteria should be proof positive to the physician that he is facing a hard proposition. To relieve such a patient often requires a therapeutic skill and adaptation and originality and judgment and vigor that is rare in the profession. The removal of a tumor or excision of an inflammatory mass is a comparatively small matter beside it. The treatment required for a neurasthenic or hysteric is as positive and vigorous and definite as that required for tuberculosis or for a broken arm. It is, of course, of a different character and must be applied with an adequate understanding of the complex problems of the nervous system and with a skillful adaptation to the special conditions present in the individual patient. In the cases requiring a trial of neurologic treatment, it is not sufficient to give the patient a course of ordinary tonics, interspersed with sedatives to relieve the troublesome symptoms. A thorough trial of neurologic treatment means the instituting of a carefully planned campaign, aimed at definite accomplishments at different stages. The planning and the execution can, as a rule, be successfully carried out only by one who has specially qualified himself for the work, either as a specialist in nervous diseases or as a general practitioner who has given the time and labor necessary to a practical understanding of the complex subject.

The author's practice is to refer all such patients to a neurologist, who assumes full charge of the neurologic treatment.

III. When operating, should *more* conservatism or *less* conservatism be practiced than in an individual with a normal nervous system?

This question has troubled the author considerably in practice. These patients in which the nervous system is unstable, are not favorable subjects for conservative surgery. A slightly damaged uterus or tube or ovary, which in the ordinary individual would cause no symptoms, may in these hypersensitive patients prove a source of chronic invalidism. On the other hand, such patients are equally unfavorable for radical operative work. It is in just such unstable patients that the removal of both ovaries occasionally causes a complete breakdown in the nervous system—a breakdown that in some cases proves irremediable. The erratic quality of the symptoms and of the patient's reactions in general, pass over into the results of the operative work. The result after either a conservative or radical operation may be better or worse than in an individual with a normal nervous system. The result is rarely an ordinary one—it is extremely good or very bad. It is the uncertainty in both directions that makes the prognosis so difficult and caution so necessary.

For the present, the author's rule of practice, when operating in the case of a patient with an unstable nervous system, is as follows: "Radicalism until the last ovary is reached, and then great conservatism." A damaged ovary or tube or uterus had better be removed, for in the hypersensitive pelvis it is likely to give persistent trouble. On the other hand, the instability of the nervous system makes the complete removal of the ovarian influence exceptionally hazardous, consequently every effort should be made to preserve an ovary or a functionating part of an ovary. The rule as to radicalism should of course be applied with due exceptions in special cases, as where the patient is very young or where she has strong desires in regard to the preservation of child-bearing or the preservation of menstruation. Again, in those very exceptional cases in which the menstrual suffering is so severe and so prolonged and resistant to treatment that elimination of the recurring menstruation is indicated, the desired result is accomplished with less hazard to the patient's nervous balance by hysterectomy with preservation of an ovary than by double oophorectomy.

CHAPTER XVII

INVASION OF THE PERITONEAL CAVITY

For the Treatment of Gynecologic Diseases

In the treatment of certain gynecologic affections it is necessary to invade the peritoneal cavity. This invasion of the great peritoneal sac in the center of the body necessarily carries with it much risk to the patient. In the preantiseptic days the mortality was great—so great that the operation was but rarely resorted to. By modern antiseptic and aseptic methods, however, the mortality has been reduced to a very small percentage. Though the mortality of the operation is small, we must not forget that there is a mortality due directly to the operation. The danger varies much in different cases, depending on the particular form of disease present and on the condition of the patient at the time of operation—but there is some danger in every case. Attention must be called to this because some physicians seem prone to overlook, or at least fail to give proper weight to the fact that occasionally a patient, with everything apparently favorable, will die, and no one can promise any patient absolutely that she will survive. One may say, in a favorable case, that the risk is very slight and that in all probability the patient will go through the operation and convalescence without trouble. But though the risk is slight, it is nevertheless a risk, and the patient or her friends must so understand it. Such necessary explanation to the patient or her relatives is made with much better grace before operation than afterward.

The peritoneal cavity may be readily entered in two ways—by incision through the anterior abdominal wall (abdominal section) or by incision through the vaginal wall (vaginal section).

ABDOMINAL SECTION

Abdominal section is incision into the peritoneal cavity through the abdominal wall. This is known as "celiotomy," "laparotomy," and as "suprapubic section." All these terms refer simply to the incision through the abdominal wall into the peritoneal cavity and not to the subsequent operative manipulations carried out within the cavity.

The incision may be located at any part of the wall—in the median line or laterally. The direction of the incision may be longitudinal or transverse or oblique, or a combination of these directions.

There is usually some additional operative procedure carried out after the peritoneal cavity is opened, and this additional procedure frequently gives the name to the whole operation—for example, ovariotomy (abdominal section with removal of an ovary or an ovarian tumor), **myomectomy** (abdominal section with removal of a myoma of the uterus), **abdominal hysterectomy** (abdominal section with removal of the uterus).

INDICATIONS

For Abdominal Section

The most common indications for abdominal section in gynecologic work are as follows:

1. Ovarian tumors.
2. Broad ligament tumors.
3. Uterine myomata with serious symptoms not yielding to other measures. The abdominal operations in these cases are myomectomy, supravaginal hysterectomy, and total abdominal hysterectomy.
4. Cancer of the uterus.
5. Extrauterine pregnancy.
6. Acute pelvic inflammation which spreads in spite of other measures and threatens life.
7. Chronic pelvic inflammation with a collection of pus high in the pelvis, as in pyosalpinx.
8. Chronic pelvic inflammation with a large amount of exudate and persistent troublesome symptoms.
9. Chronic pelvic inflammation without decided exudate, if everything else fails to relieve the pelvic distress.
10. Pelvic tuberculosis, if other measures fail to produce decided improvement.
11. Adherent retrodisplacement of uterus or persistent prolapse, causing troublesome symptoms and not yielding to less dangerous measures.
12. Obscure or doubtful pelvic disease which, in spite of other measures, threatens the patient with death or with chronic invalidism (exploratory abdominal section).

CONTRAINDICATIONS

The more common contraindications to abdominal section are:

1. Marked nephritis, especially chronic interstitial nephritis.
2. Diabetes mellitus.
3. Inoperable cancer or advanced pulmonary tuberculosis.
4. Any chronic disease, general or local, causing marked weakness and lessening the patient's resistance.
5. Acute disease that may be aggravated by the operation.
6. Any condition that would contraindicate general anesthesia, if such is to be used.
7. Dermatitis within the operative field.

All these contraindications are, of course, only relative. There may arise circumstances demanding the operation at once in spite of contraindications—that is, circumstances in which the danger of delay would be greater than the danger of immediate operation. But when the case is not one of extreme urgency, the operation should be postponed until the complicating condition can be corrected and the patient placed in better condition.

Pregnancy increases the danger of abdominal section very decidedly, but it is not often a contraindication for the reason that the disease requiring operation (for example, a large tumor or an abscess) precludes the full development of the fetus or makes the dangers from advancing pregnancy greater than those from immediate operation.

DANGERS

Of Abdominal Section

The immediate dangers of an abdominal section are three:

1. Failure of the vital forces to stand the shock of the operation. This shock is due principally to (a) the loss of blood, (b) the handling of intraperitoneal structures and (c) the anesthesia.
2. Failure of the vital organs (heart, lungs, kidneys, and gastrointestinal tract) to perform the extra work thrown on them in the first few days following the operation.
3. The development of infection, causing general peritonitis or localized suppuration.

PREPARATIONS

For Abdominal Section

In order to reduce to a minimum the dangers of the operation, careful preparation is required.

The operation should, when possible, be carried out in the clean, well-arranged operating room of a hospital, even though the patient has to be moved a considerable distance to obtain the requisite hospital facilities. Abdominal section is too serious an operation to be undertaken in the home if the patient's condition will permit her removal to a hospital.

When the operation must be performed at the home of the patient, the room should be made as clean and free from dust as possible by the following steps:

a. One or two days before operation remove the bric-a-brac and superfluous furniture and sweep the walls, ceiling and floor thoroughly.

b. The carpet may be removed, leaving the bare floor, or, after sweeping the carpet well, it may be covered completely with oilcloth well tacked down.

c. All the woodwork should then be thoroughly scrubbed with soap and water and afterward with an antiseptic solution.

The further preparations for the operation may be divided into three parts as follows:

A. Preparation of the patient.
B. Preparation of instruments and dressings.
C. Preparation of operator and assistants.

A. **Preparation of the Patient.**—The patient, having been subjected to a careful general examination, including urine analysis, to exclude contraindications, is sent to the hospital one or two days before operation, that the proper preparation may be carried out. Of course there are cases of rapidly spreading pelvic inflammation, or of intraabdominal hemorrhage or injury, in which the abdomen must be opened at the earliest possible moment. In such a case there is no time for preliminary preparation—careful immediate sterilization is carried out and the abdomen is then opened. But when the case is not an emergency one, the preliminary preparation should be made. It gives the patient a decidedly better chance of complete and uninterrupted recovery.

The purposes of this preliminary preparation are:

a. To tone up the patient's nervous system so that she will be better able to stand the operation.
b. To see that the kidneys are in good working order, and to prepare the urine for possible catheterization.
c. To nourish the patient so as to limit intestinal decomposition, and to empty the intestinal tract just before operation.
d. To prepare a sterile field for the operative work.

These desired results are secured by a program ordinarily about as follows, supposing the time for operation to be an early morning hour:

1. *Nervous System and General Measures.*—If the patient is weak or atonic, it is well to give strychnia sulphate $\frac{1}{40}$ gr. by mouth every four to eight hours, depending upon the amount of stimulation needed. If the patient's stomach is much disturbed, this may be given hypodermatically. Such other medicines should be given as are indicated by pain or nausea or cough or other symptoms. If there is a vaginal discharge, give an antiseptic douche once or twice daily.

2. *Kidneys and Urine.*—Determine whether the kidneys are doing their work well. Make the regular analysis of the urine, and, when indicated, the special examinations. As the patient may have to be catheterized after operation, it is well to give some urinary antiseptic for a day or two before. Have the patient take water rather freely.

Formerly the author took particular pains to thoroughly saturate the patient with water before operation, for the purpose of aiding the kidney-action after operation and diminishing the thirst, but he has discontinued the practice as a routine because he found certain drawbacks—the principal one being that it interfered with spontaneous urination after operation. The avoidance of catheterization is much to be desired and can usually be accomplished, provided the bladder does not fill until the patient has well recovered from the anesthesia. In the water-saturated patients, the urine is secreted so rapidly that frequently the bladder becomes distended before the reflexes are sufficiently established to bring about spontaneous urination. In certain cases, however, where the kidneys are defective, the author still employs it.

3. *Diet and Laxatives.*—Light diet is to be given up to and including noon of the day before operation, then liquids only, but with water in abundance. After midnight, just preceding the operation, nothing is to be given by mouth but water—the water may be continued up to within an hour of the operation.

An enema is to be given the night before and again the next morning. In cases of marked habitual constipation and cases where the bowels are not to be moved for some time after the operation, such as in repair of complete laceration, it is well to give a dose of castor oil at 3 P.M., the day before operation.

The idea is to have the intestinal tract in as nearly a normal condition as possible, with simply a good clearing out of the lower bowel just before the operation. Experience has shown that this simple method of preparation brings the patient to the operating table in better condition and causes less disturbance after the operation than the prolonged dieting and purging formerly employed. The latter upset the functional routine of the intestine, disturbed the normal peristalsis, increased the intestinal irritation and putrefaction, and reduced the patient's strength. Since omitting the cathartic, except in special cases, there has been a marked decrease in post-operative nausea and vomiting and distention. In many cases not even the rectal tube is necessary for relief of gas pains and it is only rarely that other measures must be resorted to.

When there are complications that may necessitate resection of the intestine or opening of the stomach, then, of course, the usual preoperative measures for approximate sterilization of the upper intestinal tract should be employed.

4. *Sterilization of the Field.*—In the preparation of the operative field, as in the intestinal preparation, the trend of practice has been toward simplicity. It has been found that some of the measures formerly employed served to irritate the skin and increased rather than diminished the chance of inflammation. This was true particularly of the strong antiseptics applied for long periods preceding operation. Instead of the extensive soap poultice and the prolonged antiseptic pack, the following method, with minor modifications, is now employed generally:

The afternoon before operation the abdomen is lathered and shaved. It is then scrubbed with green soap and, after soap is removed, with sterile water, and then the surface is washed with alcohol. The cleansed surface is covered with a sterile towel or sterile cotton, held in place with a binder.

After the patient is anesthetized, the dressing is removed and the surface resterilized. For this purpose iodine or picric acid solution may be used. If the former, the surface is painted with a 3½ per cent solution of iodine in alcohol. To provide the solution, the tincture of iodine may be diluted with alcohol to one-half strength or, if preferred, iodine crystals may be dissolved in 95 per cent alcohol. The application should be made from the area of incision outward, so that this area may not be contaminated by material brought from the periphery. After the first coating of iodine has dried another coating is applied along the line of incision, and the iodine over the remaining part of the abdomen is removed with alcohol. The sterile towels and sheets are then arranged about the field and the incision is made. After the operation all the remaining iodine should be removed with alcohol before the patient leaves the table and before any adhesive strips are applied. Some patients have an idiosyncrasy to iodine and any of it left on the skin causes a severe dermatitis, particularly under the adhesive strips. If spinal anesthesia is to be used, the lumbar region is prepared in the same way.

For some time the author has been using picric acid instead of iodine for preoperation sterilization in all localities, and much prefers it. A 5 per cent solution of picric acid in 95 per cent alcohol is painted over the surface, with a second coating along the line of incision. It eliminates the skin irritation and blistering of iodine, does not have to be removed, and seems to give a deeper and longer-lasting skin sterilization. Several articles have appeared detailing facts and experiments concerning it. Hewitt has given a good presentation (Am. Jour. Obst. and Gynec., April, 1921).

All preparation after anesthesia should be carried out **rapidly**, that the time under anesthesia be not unduly lengthened.

B. **Preparation of Instruments and Dressings.**—There are several ways of preparing instruments, sutures, dressings, etc.

The usual method is as follows:

1. **Instruments** are boiled ten to fifteen minutes. They must be entirely immersed in the water and the water must boil (not simply simmer) for at least ten minutes. A 1 per cent solution of sodium carbonate (washing soda) is preferable to plain water, as it tends to prevent rusting of instruments. There are a few exceptions to the boiling rule. The knives and scissors are usually soaked in 95 per cent carbolic acid for ten minutes or in 10 per cent carbolic solution for half an hour, as boiling tends to dull them. However, if in a hurry, they may be boiled with the other instruments, in which case the cutting edge should be wrapped in cotton.

2. **Sponges** and pads and dressings are sterilized in the steam sterilizer. The gowns for operator and assistants and the sterile cloths and sheets, and instruments, trays and basins are put through the same process.

In emergency work in the country where no steam sterilizer is available, an ordinary wash boiler may be used. The various articles to be sterilized (gauze, sponges, towels, sheets, gowns, etc.) are wrapped in small packages, each package being wrapped in two thicknesses of cloth, and are then boiled for thirty minutes. In order to dry the gowns somewhat, they may be removed from the boiler, wrung as dry as possible with clean hands, being careful not to disturb the double covering, and then dried in an oven.

Continuous Gauze-strip Sponges.—In regard to the form of sponges to be used, the author strongly recommends the continuous gauze-strip sponges for abdominal work. The numerous detached sponges ordinarily used are dangerous and have led to many serious results. A sponge left in the peritoneal cavity following an operation constitutes one of the most deplorable accidents of abdominal surgery. This is not a new subject. Much has been written upon it and many cases have been reported, and many suggestions have been made as to preventive measures. But all such measures hitherto proposed have broken down under the various circumstances and vicissitudes of surgical work, as evidenced by the facts cited in an extensive review by the author (Am. Jour. Obst., 1909, lix, No. 2). In this connection attention must be called to the following facts:

a. Sponges are lost in the peritoneal cavity much more frequently than is generally supposed. And it must be kept in mind that the reported cases represent only a small proportion of the recognized cases, for, naturally, the accident is not given publicity except where there is some special reason for doing so. In any large body of surgeons a little experience meeting, in which testimonies are freely given, will bring to light a number of unreported cases of this accident.

Furthermore, many cases are not even recognized. The patient dies with evidence of peritonitis; there is no suspicion of any foreign body having been left in the abdomen, no postmortem examination is made and the death is supposed to be due to ordinary peritonitis. The possibilities in this direction are indicated by the fact that in a reported series, in thirty-nine of the cases the accident was recognized only on postmortem examination, when the sponge was found, but would have remained unknown had there been no autopsy.

b. It is a most serious accident. In the large series of cases collected, more than one-fourth of the patients died, and of those who recovered many went through weeks and months of suffering.

c. To persons outside the profession the accident seems absolutely inexcusable. They can understand how other complications may arise, such as hemorrhage or sepsis or kidney failure, in spite of every precaution, but they can imagine no reasonable excuse for allowing a sponge to be lost in the patient's interior. To those not familiar with surgical work it seems past belief that the surgeon would carry into the peritoneal cavity anything the removal of which was not provided for with absolute certainty.

The growing cognizance of the public in regard to the occurrence of this accident and the feeling in regard to the responsibility for it are reflected in the increasing number of lawsuits connected therewith.

d. There has hitherto been no sure preventive method which was applicable in all the circumstances of abdominal surgery. The list of preventive measures recorded shows that much thought has been given to devising means for preventing this accident. Rules interminable have been proposed, and expensive and cumbersome racks and stands devised for the purpose. Not one of these devices, however, has proved absolutely safe, for the reason that in their use the certain removal of all sponges carried into the abdomen depends on the studied attention of the operator or on a system of attentive cooperation among assistants and nurses. While such attentive cooperation is entirely feasible under ideal conditions and with ideal persons, the fact remains that it is not secured and is not likely to be secured under the variable circumstances of abdominal work. The many emergencies which arise in the course of abdominal operations, the changing assistants and nurses, the hurried operations at night in the hospital with short help, the operations in private homes where the patient cannot be taken to the hospital at all—all these conditions play havoc with safety arrangements depending upon a nicely balanced system of rules and cooperation or on the use of cumbersome racks or stands.

There is not space here to take up in detail the various ways in which mistakes have occurred; suffice it to say that a review of the cases where dependence was placed on counting shows an appalling list in which a sponge was left, because one was hastily torn in two and one-half forgotten, or an extra one was primarily included in the bundle and missed in the counting, or an extra one was secured for an emergency during the operation, or some loose piece of gauze, not intended for intraperitoneal use, slipped in while near the wound, or a mistake was made in the final count of the sponges removed. It is astonishing what slight inattention may lead to a sponge being left, and the consequent death of the patient.

The method of attaching a tape to each sponge and then fastening a forceps to the tape and at the same time to the abdominal sheet, is the method probably in most general use. It has a record of many accidents—the tape pulled off the sponge, or there was a failure to attach the forceps, or the forceps failed to hold well. In one case recorded the sponge, tape and forceps were all lost in the cavity.

The difficulty of guarding absolutely against leaving a sponge in the abdomen is such that entire security against this fatal accident is counted one of the unsolved problems of abdominal work. Practically all writers on the subject state that there is no guaranty against its occurrence, even in routine hospital work and with all the rules of cooperation and the special apparatus designed to prevent it. Neugebauer, in a most exhaustive consideration of the subject, comes to the conclusion that the accident is, to a certain extent, unavoidable. Schachner, in an excellent paper, states, "So long as surgery continues an art, just so long will foreign bodies continue to be unintentionally left in the abdominal cavity." Findley states, "In former years the abdominal surgeon was seriously disturbed by well-grounded fears of secondary hemorrhage and sepsis, but surgery has mastered these problems to a large degree and they are little feared and seldom experienced. Now it is the thoughts of the sponge that disturb the night's repose when the report comes that something has gone wrong with our patient. The operator never can rid himself of the feeling of uncertainty as to the possibility of leaving a sponge." This expresses very well the feeling of those who have given attention to this subject, and particularly of those who have personally experienced the accident and have thus been brought face to face with a concrete exemplification of the inadequacy of the usual methods.

The continued occurrence of this fatal accident and the failure of the preventive methods in general use constitute sufficient reason for emphasizing a method which the author has used with much satisfaction for many years. This method gives entire security and at the same time is simple and inexpensive, and is effective in all conditions of abdominal work—in the emergency operation in the country with unfamiliar assistants, as well as in the routine hospital work. The failure of the safety methods in general use is due to their dependence upon sustained attention concerning the sponges, which attention on the part of the surgeon cannot be given to the sponges, for it is required elsewhere. A method, to be effective under all circumstances, must be practically automatic, insuring the removal of all gauze without particular attention on the part of any one at the time of the operation.

THE METHOD

The underlying principle of this method is the elimination of all detached pads and sponges. In place of them long strips of gauze are used, each strip being packed into a bag in such a way that it may be drawn out a little at a time as needed.

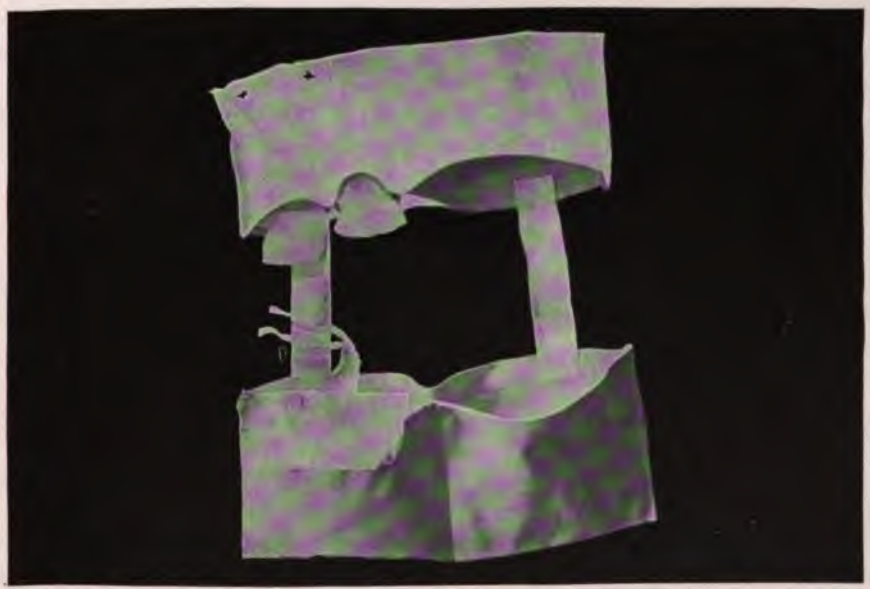


Fig. 926.—Continuous gauze-strip sponges with bags containing them. The bags filled and sterilized and ready to be applied to the abdomen. The end of each small gauze-strip is sewed securely to the bottom of the bag, as indicated by the black threads. The wide gauze-strip is to be removed from the large pocket, wrung out of hot saline solution, dropped back into the pocket and the tapes tied about the belting. (Crossen—*Operative Gynecology.*)

The author was led to a study of the subject and the adoption of this method by an unfortunate experience. Following the usual technic he operated for years without accident, and then one day he left a gauze pad in the abdomen. The case was one of diffuse pelvic suppuration, requiring extensive drainage, and, fortunately, the pad was discovered and extracted through the drainage opening about two weeks later. The patient recovered without serious result from the accident—but the lesson was not lost. He determined to find some method that would really prevent such an accident—a method which would be entirely under the control of the operator and first assistant (a greater division of responsibility increases the danger) and one which would occasion no delay in the closing steps of the operation. There had to be taken into consideration the large pads for holding the intestines out of the way and the small pads and gauze pieces for sponging. In place of several large pads for packing back the intestines, the large roll of gauze, then in use by a number of operators, was adopted and found satisfactory.

The matter of the small pads and sponges, however, was not so easily disposed of. It was imperative to find some method that would do away entirely with dependence on the counting of the sponges at the close of the operation.

After a good deal of experimenting with various methods, it became evident that if safety were to be secured, the detached pads and sponges must be eliminated entirely. In pursuance of this idea the author devised the method here described. The principle of this method is that no detached piece of gauze shall enter the abdominal cavity. Each piece of gauze introduced for sponging is simply part of a very long piece, the greater part of which is always outside the cavity. It has been found convenient to make a pocketed bag of heavy canvas for each side (the completed bag being about 12 x 24 inches), and attach them together across the median line, as indicated in Fig. 926. There are extra pockets into which may be placed the soiled portions of the strips as they are used. The set as used at present therefore consists of the following:

Gauze-Strip Sponges for Abdominal Section.*

Two narrow strips—10 yd. long, 3 in. wide—6 thicknesses.
One wide strip—5 yd. long, 9 in. wide—4 thicknesses.
One "saddle" of pocketed heavy canvas bags, attached together.
Have extra strips in reserve.

For the narrow strips the yard-width of gauze is divided into two strips, and each of these, when folded to six thicknesses, is about three inches wide. For the wide strip the full yard-width of gauze is used—when folded to four thicknesses it is nine inches wide. Turn in all raw edges so that no raveling can be left in the abdominal cavity.

The strips are to be folded back and forth in such a way that when placed in the pockets they may be drawn out a little at a time as needed for sponging. Each narrow strip is placed in its pocket and one end fastened to the wall. The wide strip is placed in the pocket, but not fastened, as it is to be taken out and soaked in warm saline solution before use. The "saddle" is now ready for sterilization and storage.

When preparing for operation the wide strip is removed and soaked in warm saline solution. Just before the incision, it is wrung out of the saline solution, placed in its pocket, and the end fastened by the tapes for that purpose shown in Fig. 926. In sponging, the soiled portion of each strip is discarded into the empty pocket on that side. The bags should be made of very heavy canvas (No. 4 duck), as they then retain the heat and moisture in the packing strip. The heavy material serves better, also, to protect from soiling and from the accident of blistering the skin, which has happened occasionally through insufficient protecting material under a hot strip.

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*A detailed and illustrated description of this method is given in the author's Operative Gynecology.

This method eliminates all chance of leaving a piece of gauze in the abdomen, for a large part of the strip is always outside the cavity, and the end is fastened securely outside. An important point is that the sure removal of all gauze is practically **automatic.** It does not depend on the accuracy of a hurried counting of sponges at the close of the operation or catching each sponge-tape with a forceps as it is put into the cavity, or on a studied "watching what sponges go in and what sponges come out of the cavity." Those methods that depend for safety on the observance of complicated rules or on the strict following of a regular routine, or on the constant attention of the operator, have all broken down, as reported cases clearly show. A method, to be safe and suitable for general use, must be practically automatic in the removal of all gauze carried into the cavity, must be comparatively inexpensive in materials and preparations, must be fairly simple and convenient in use, and must be applicable in every environment, including emergency work in the country. These requirements are met by the method here described.

The dangers from hemorrhage and sepsis in clean cases have been largely done away with through improvements in technic, and now this other serious menace in abdominal work should be eliminated. The patient has a right to demand, and is demanding as the many lawsuits show, that **real protection** be afforded against leaving a sponge in the abdomen. It seems only justice to those who intrust themselves to our care that we should provide absolute security against this fatal accident, so far as such security is practically attainable.

This method also simplifies the preparations for abdominal section—all the many pads and sponges of various sizes being replaced by three strips of gauze. The gauze is simply folded and then tacked by a few stitches at each end to prevent unfolding. Nurses as a rule welcome the method, stating that it is much less troublesome than the sewing of the numerous small pads and sponges. The bags may be used again and again after sterilization.

Long Instruments

In about one-fourth of the recorded cases of a foreign body left in the abdomen, the article left was a forceps or piece of an instrument or other small object used about the wound. This calls attention forcibly to the fact that small instruments should not be allowed about an open abdominal wound. Neugebauer long ago called attention to this danger of small instruments, and urged the use of long instruments exclusively in abdominal work.

Many surgeons have adopted this safety measure, but there are many others who seem to give no thought to the matter, and continue to use numerous small instruments in this dangerous locality. It may not be possible at present to entirely prevent the accident of leaving some article of the surgical armamentarium in the abdomen, but it is possible to reduce the danger to a minimum by the use of long instruments exclusively, and it seems to me that all those who are engaged in abdominal surgery should be led by common prudence to adopt this simple expedient. The details, as carried out in the author's work, are as follows: Every instrument used about the wound is long—so long that a portion of it is practically always outside the abdominal cavity. Again, if by accident such an instrument should slip entirely into the cavity, its length is such that it would almost certainly be felt when the hand is carried into the cavity for the final palpation before closing. All the artery forceps, dissecting forceps, tenaculum forceps, pedicle needles, scissors and other instruments for internal work are from six and one-half to eight inches long, the shortest being the large dissecting scissors (six and one-half inches). The shortest instrument used anywhere about the wound is the scalpel (six inches), which is laid aside as soon as the peritoneal cavity is open. The needles and Murphy buttons are not brought near the wound, except when held with a forceps or with a suture attached. No Michel clamps (for holding rubber tissue or gauze along the wound margin) or other small unattached objects are allowed near the wound as long as the peritoneal cavity is open.

3. As to **suture** and **ligature** materials, silk and silkworm-gut are boiled along with the instruments. Reliable catgut may be purchased, sterilized and ready for use.

4. The **rubber gloves** may be wrapped in a towel and boiled along with the instruments. After boiling they are placed in 1-5000 bichloride solution. They are much easier put on when partly filled with solution. The weak bichloride solution is used, so as to kill any bacteria that may work to the surface of the skin of the hands during the course of the operation. When the gloves are put on in simply sterile water, the warm mixture of sterile water and macerated epithelium, which forms in the glove during the course of a long operation, becomes a culture medium for the bacteria which work to the surface from the deeper layers of the skin, and which may be liberated in the peritoneal cavity by a puncture of the glove.

Where the dry method of glove preparation is used, it is well to soak the bands in bichloride solution before drying them to put on the gloves.

C. **Preparation of Operator and Assistants.**—Everything that is to come in contact with the operative field must be sterilized. The hands and forearms of the operator and assistants must be disinfected as far as possible, and should then be covered, so that there is no chance of direct contact of the operative field with the skin of the hands or arms, for the skin cannot be absolutely sterilized. Again, the operator and assistants must be so covered as to effectually protect the field of operation from contamination by the clothing or by particles from the hair or beard, or by particles carried in the breath.

The accomplishment of this thorough protection of the operative wound has been the object of many decades of study and experimentation. The present effective technic for the preparation of the operator, as well as all the other antiseptic and aseptic preparations, was attained gradually by improvements added year by year, but it is all the direct outgrowth of the epoch-making work of Pasteur and of Lister. The following are the steps in the preparation of the operator and assistants:

1. The sleeves are rolled well up above the elbows and the finger-nails are trimmed short and cleaned thoroughly.

2. The hands and forearms are then scrubbed carefully and vigorously,

for ten minutes, with warm water and some liquid preparation of green soap—using a stiff brush and giving particular attention to the irregularities about the nails and knuckles and to the spaces between the fingers at their junction with the hand. Where the brush causes undue irritation of the skin, gauze is preferable for scrubbing the arms, but not for the hands.

3. Then the soap is washed off with sterile water, and the hands and forearms are scrubbed in 80 per cent alcohol with gauze.

4. Then they are soaked in bichloride solution (1-2000).

5. The sterile gown is then put on, the hair and mouth and neck and greater part of the face are covered with gauze, the rubber gloves adjusted and the operator is ready to begin. The gauntlet of the rubber glove is brought up over the lower end of the sterile sleeve to hold it in place, and the arm is thus securely covered and there is no chance for any skin surface to come in contact with the wound.

The assistants must go through the same process.

The process of hand disinfection given above is known as the "alcohol-bichloride" method. It is also called, from its originator, the Fürbringer method.

There are three **methods of hand disinfection** which are much used. The thorough scrubbing with green soap and warm water is common to all of them. The further steps differ as follows, for the three methods:

a. The "alcohol-bichloride" method. The various steps in this method are given in detail above.

b. The "permanganate and oxalic acid" method. The hands and forearms are next immersed in a hot saturated solution of potassium permanganate and kept there until the skin takes on a dark brown color, then they are immersed in a hot saturated solution of oxalic acid until the skin again has its natural color. The oxalic acid is washed off in sterile water or sterile lime water, and the hands and forearms are then washed in bichloride solution (1-2000).

c. The "Chlorinated lime and sodium carbonate" method. After the preliminary scrubbing a tablespoonful of chlorinated lime is taken in the palm of the hand, moistened with enough water to make a thick paste, and then a piece of sodium carbonate (washing soda) about the size of the thumb is crushed in the hand and rubbed thoroughly into the lime paste. This mixture, containing nascent chlorine, is then rubbed vigorously into the skin of the hands and forearms for several minutes. The parts are then washed in sterile water, and later in weak ammonia water to remove the chlorine odor.

As to the choice of method of hand-disinfection, that is largely a matter of personal preference. Any one of the above three methods, properly carried out, will give good practical hand-disinfection—i.e., from hands and arms so prepared, infection will rarely if ever take place. The important thing is not which method is chosen, but **how thoroughly** the chosen method is carried out. The author has used all three methods, and very decidedly prefers the "alcohol-bichloride" method, though nothing serious can be said against the others.

Absolute disinfection of the hands and arms is impossible by any method, as the disinfection is necessarily confined to the superficial layers of the epidermis. Bacteria situated in the deeper layers of the epidermis may work to the surface during the course of the operation; hence the importance of thoroughly covering the prepared hands and arms with rubber gloves and sterile gown.

REGULAR STEPS

In Abdominal Section

In order to present some idea of the main features of this important therapeutic measure, the regular steps in this operation will be simply enumerated, and later some of the special points that require attention considered briefly.

The regular steps incident to every case of abdominal section are as follows:

1. Anesthesia.
2. Incision.
3. Exploration.
4. Correction of pathologic condition.
5. Toilet of peritoneum.
6. Closure of incision.
7. Dressing.

1. **Anesthesia.**—Ether is safer than chloroform, and is to be preferred in all cases except where there is some definite contraindication.

There is neither space nor occasion here for a general consideration of anesthesia. There is one point, however, that is important, and that is the position of the patient's arms during anesthesia. Many cases of paralysis of one or both arms following anesthesia have been reported—the paralysis lasting for many months and sometimes for a year. It is due largely to faulty position of the arms during anesthesia. This is an important matter and attention should be called to it in every work dealing with anesthesia—and yet it is seldom mentioned. In 1905 the author reported two cases of such brachial paralysis in detail to the St. Louis Medical Society, called attention to previous work and investigations on the subject, and demonstrated, directly on the cadaver, the compression of the brachial plexus by the clavicle when the arm is above the head (Jour. Mo. State Med. Assn., 1905). As stated in the article, this has long been recognized as the cause of the paralysis, the attention of the profession generally having been first called to the subject by Budinger in 1894. No case of paralysis has ever occurred, as far as known, when the elbows were kept to the side.

Gas-oxygen anesthesia is preferable in some cases, particularly in the presence of complicating acute conditions in the respiratory tract.

Local anesthesia is useful in selected cases, especially in patients in whom general anesthesia is seriously contraindicated.

For some time the author has been using hyoscine-morphia analgesia as a preanesthetic sedative, and with much satisfaction. Morphia sulphate 1/4 gr. and hyoscine hydrobromide about $\frac{1}{130}$ gr. (one ampule—B&W) are given hypodermatically one hour and forty-five minutes before the operation. The hyoscine (but not the morphia) is repeated forty-five minutes later, i.e., one hour before operation. The patient is then catheterized and afterward kept quiet with the room darkened until taken to the operating room. The hyoscine-morphia analgesia eliminates the preoperation anxiety, which is so troublesome to some patients and more or less troublesome to all. Also, the patients take the anesthetic more quietly and require less for operations of the same length. Again, there is less postoperation vomiting and distress. The dose of the drugs should of course be adjusted to the size and condition of the patient, being somewhat less than the above for small or weak individuals.

2. **Incision.**—In abdominal section for pelvic disease the incision is made almost invariably, in the median line. All parts of the pelvis may be reached from such an incision and, in practically every case, exploration of the whole pelvis should be made. Ordinarily the incision is begun near the umbilicus and continued downward four to six inches. If there is no large solid tumor, the incision is made small at first, but large enough to admit the fingers or hand into the pelvis for exploration. As a rule the primary incision is about five inches long. If the abdominal walls are very thin, it may be shorter; if they are very thick, it must be longer.

The lower the incision is placed, the more easily the deeper portions of the pelvic cavity may be reached. When a tumor is present, the bladder may be drawn up considerably; consequently in such a case the incision must not be extended low until the peritoneal cavity has been opened and the bladder located. If it is thought that the bladder may be drawn so high as to interfere with the ordinary incision, a steel bougie may be introduced into the bladder and the height of its cavity determined before the incision is made.

In cutting through the abdominal wall it is not necessary to strike the tendinous tissue between the recti muscles. If the incision is made a little to one side of the tendinous center and passes through the rectus muscle of that side, it makes little difference. Consequently, no time should be lost trying to make a careful dissection exactly in the median line.

The incision is continued through the skin and the subcutaneous fat and fascia, and the rectus muscle with its tendinous sheath, down to the loose subperitoneal fat. When the subperitoneal tissue is reached, all bleeding is stopped, and the subperitoneal fat and connective tissue are cut through between two dissecting forceps. The peritoneum is then picked up with the dissecting forceps and a short cut is made in it, and this opening in the peritoneal cavity is enlarged by scissors or knife.

Sterile towels now may be fastened on either side to the edges of the perineum to avoid any contact with exposed skin surface.

3. **Exploration.**—When the proper opening has been made, the hand is introduced into the peritoneal cavity and the various pelvic organs are outlined and the pathologic condition determined as accurately as possible.

4. **Correction of Pathologic Condition.**—After the exploration of the pelvic

cavity and the determination of the exact condition present, the particular measures to be employed will depend on the nature of the trouble—the various affections requiring very different methods of treatment.

5. **Toilet of the Peritoneum.**—All blood and clots are sponged out of the pelvis and, as far as practicable, the pedicle ends are turned under and all raw surfaces covered with peritoneum. All abdominal pads are then removed, the intestines are permitted to come back into the pelvis (the patient having been lowered from the Trendelenburg posture) and the omentum is spread out in its proper place.

6. **Closure of Incision.**—There are two methods of closing the incision—(a) by "through and through sutures" of silkworm-gut and (b) by "tier sutures" of catgut or other absorbable material. Except in hurry cases, where it is exceptionally important to get the abdomen closed as quickly as possible. the preferable method is the latter—approximation by the tier sutures of catgut, with or without three or four tension sutures of silkworm-gut.

7. **Dressing.**—The dressing of the abdominal wound consists of a large thick dressing of sterile gauze over the wound, next to that a layer of sterile absorbent cotton covering the anterior surface of the abdomen, and over that a medium-thick layer of sterile common cotton to turn any water that might be spilled on the dressing during convalescence and to give even elastic pressure at all points—the whole held in place by a binder about the abdomen, with perineal straps to hold it well down.

SPECIAL POINTS

In Abdominal Section

There are a number of special items that must receive careful consideration by every one doing abdominal section work. Among these may be mentioned the following:

1. Drainage.
2. Shock.
3. Injury to adjacent organs.
4. Foreign bodies in abdomen.

1. **Drainage.**—The rule in abdominal surgery is never to drain unless there is some special reason for it, and that special reason must be a very strong one. Experience has abundantly shown that in all but exceptional cases the best results are obtained by closing the peritoneal cavity completely and leaving Nature to carry on the reparative process alone, undisturbed by tubes or gauze or other form of drainage.

That small percentage of cases in which drainage is advisable includes the following classes:

a. Rapidly spreading inflammation of the peritoneum or acute general peritonitis. In such cases free drainage is indicated, and as a rule the freer the better.

b. Rupture of abscess in pelvis. This accident happens not infrequently during the enucleation of an inflammatory mass containing pus. In some cases the pus is not confined in any removable sac, but has burrowed in various directions among the adherent organs. In such a case as soon as the adhesions are separated the pus flows out into the peritoneal cavity.

c. Persistent free oozing from surfaces left after the enucleation of an inflammatory mass. Here the effect desired is pressure rather than drainage, but, as the end of the gauze used for pressure must be brought out through the abdominal wound or through the vagina, it is usually referred to as a drain or pack.

2. **Shock.**—The principal factors in shock are (a) loss of blood, (b) exposure and handling of abdominal contents and (c) long anesthesia. To avoid shock, therefore, particular attention must be given to the following points:

a. Careful hemostasis. All vessels that can be located are ligated or clamped before they are divided. In cutting through ligated tissues, forceps are in readiness to catch any vessel that may have escaped the ligature or upon which the ligature is not tight enough.

b. Protection of the abdominal contents, so far as possible, from handling and exposure. The Trendelenburg posture accomplishes this to a large extent. In this posture the intestines and omentum gravitate into the upper part of the abdominal cavity, away from the field of operation. Those parts that still tend to protrude into the pelvis are held out of the way by gauze or rubber dam, which, at the same time serves to wall off the pelvis from the abdominal cavity. When the intestines are unavoidably permitted outside of the peritoneal cavity, they should be kept covered with large sterile towels soaked in warm saline solution.

c. Minimum duration of anesthesia. To cut down the duration of the operation and consequently of the anesthesia, the operator should work rapidly—as rapidly as is consistent with safety and accuracy—but accuracy must not be sacrificed to haste.

In this connection attention should be called to the fact that nurses and assistants may materially shorten the time under anesthesia by working rapidly in every step of the post-anesthesia preparation. Here, again, accuracy must have first consideration, but that is no excuse for the slow, painfully slow, preparation so often seen. The most efficient nurse or assistant will execute the steps of the preparation **rapidly** as well as accurately and thus reduce the anesthesia time and the operative strain.

3. **Injury to Adjacent Organs.**—The ureter, the bladder and the intestines are the organs particularly liable to injury in difficult cases. Ordinarily an injury of any of these organs occurring in the course of an operation must be repaired at once or at the close of the operation, and anyone doing pelvic surgery must be prepared to immediately take care of the injuries mentioned.

4. **Foreign Bodies Left in the Abdomen.**—The absolute certainty of the removal of all articles carried into the peritoneal cavity is a subject that deserves most careful consideration. It is surprising how easily and quickly the intestinal coils will enfold an object and carry it out of sight and touch.

The prevention of this by the use of continuous gauze-strip sponges and long instruments has already been mentioned under the "preparation of instruments and dressings."

VAGINAL SECTION

Vaginal section is incision through the vaginal wall into the peritoneal cavity. If the entrance is made behind the cervix, it is known as "posterior" vaginal section. If the opening is made in front of the cervix, it is known as "anterior" vaginal section.

In some cases of pelvic disease it is better to enter the peritoneal cavity from below; i.e., by vaginal section; while in other cases it is better to enter from above; i.e., by abdominal section.

ADVANTAGES

Of Vaginal Section

The advantages of Vaginal Section, in suitable cases, are as follows:

1. Less danger. There is less exposure and handling of the intestines and peritoneum. In vaginal section the manipulations are nearly all in the pelvic cavity, while in abdominal section the central portion of the great peritoneal sac is invaded; therefore, in vaginal section there is less shock and less danger of general peritonitis. Again, if infection should develop after vaginal section, it is very likely to be "walled off" from the general peritoneal cavity and to cause simply local suppuration, whereas when infection appears after abdominal section it is very likely to take the form of an acute general peritonitis.

2. Evacuation of pus without contamination of peritoneal surfaces. This is one of the strongest points in favor of vaginal section in suitable cases. As a rule, when there is a large collection of pus that can be reached from below, it should be evacuated that way. This is particularly important if the pus be of recent origin. In such a case it is very important to prevent soiling of the peritoneal surfaces with this infectious fluid. This is accomplished by opening from below.

Again, in many cases of pelvic suppuration, the pelvic cavity, containing the abscess, is entirely shut off from the general peritoneal cavity by a wall or roof of inflammatory exudate, which binds together the upper pelvic structures. When operating from below we work beneath this roof, which protects the general peritoneal cavity from contamination.

3. Better drainage. In vaginal section the opening is made at the lowest part of the pelvic cavity—the best place for drainage.

4. Quicker convalescence. There is less disturbance of the intraabdominal structures. Also the wound is smaller, better protected and supported by surrounding parts, and is not so likely to be followed by hernia.

5. No visible scar. This is of some importance. A long scar marking the site of a former opening into one's interior is not particularly pleasant for the patient to contemplate. It is an ever-present reminder of the disease that

was present and of the operation. It is well to avoid making such a scar in cases where other methods are just as good.

6. Vaginal section combines easily with certain plastic operations, which are sometimes indicated at the same time.

DISADVANTAGES

The disadvantages of vaginal section are:

1. Lack of room in the operative field. The manipulations are cramped and are carried out with less certainty of accomplishing the desired result.

2. Imperfect exploration of pelvis and lower abdomen. The pelvic structures are harder to reach and the lower abdominal structures (appendix, etc.) cannot be satisfactorily reached at all. And of the structures reached, the determination of their condition must be usually made almost together through the sense of touch, for the structures can be only imperfectly exposed to sight.

3. Remnants remain. Where the adhesions are extensive there is likely to be imperfect work unless the uterus is removed, and in many cases it is not advisable to remove the uterus.

4. There is not so good a chance to determine whether or not the conditions are favorable for conservative work on the ovaries or tubes, and the work itself, when indicated, cannot as a rule be so satisfactorily executed.

5. Appendix affections cannot be satisfactorily handled. The appendix is diseased and requires removal in a considerable proportion of patients with pelvic disease.

SELECTION OF CASES

The operative cases in which the author considers the **vaginal operation preferable** to the abdominal are:

1. Acute infection in the pelvis that has not yet spread to the general peritoneal cavity. This acute severe pelvic peritonitis is seen principally in cases of sepsis following labor or abortion. If general peritonitis is present, abdominal section is preferable.

2. A collection of pus low in the pelvis within easy reach of the fingers, particularly if there is a probability that the general peritoneal cavity is well walled off above.

3. For exploration of the pelvis in certain doubtful cases when it is evident that all the information required can be determined from below.

The operative cases in which the author considers **abdominal section preferable** to vaginal section include:

1. Chronic inflammatory lesions, with or without a collection of pus.

2. Cases of adherent retrodisplacement of the uterus.

3. Cases in which conservative work on ovaries or tubes is probably required.

4. Ovarian and broad ligament and uterine tumors (except certain myomata that can be satisfactorily removed from below).

5. Extrauterine pregnancy (except where all that remains is a walled-off hematocele).

6. Cases complicated with, or probably complicated with, appendix trouble.

7. Obscure cases, requiring thorough examination of the pelvis and lower abdomen.

PREPARATIONS

For Vaginal Section

The preparations for vaginal section are practically the same as for abdominal section, except that, in the preparation of the operative field, the external genitals and the vagina are prepared instead of the abdomen.

The patient receives an antiseptic douche one to three times daily, depending upon the amount and character of the discharge. The afternoon or evening before the operation the external genitals and adjacent surfaces are shaved. After the patient is anesthetized the external genitals and vagina are scrubbed thoroughly with soap solution and rinsed with sterile water. A 5 per cent solution of picric acid in alcohol is then applied freely to the external genitals and to all parts of the vagina.

In certain complicated cases and in doubtful cases the abdomen also should be prepared, as it may be necessary to employ abdominal section in order to deal satisfactorily with the conditions found.

STEPS

In Vaginal Section

The steps in the operation are essentially the same as for abdominal section, changing the field from the abdominal surface to the depths of the vagina. The steps are:

1. Anesthesia.
2. Exposure of operative field by suitable retractors.
3. Incision and entrance into the peritoneal cavity.
4. Exploration.
5. Correction of pathologic condition.
6. Restoration of structures to approximately normal relations.
7. Closure of incision or drainage, as thought preferable in that particular case.
8. Dressing.

CONSERVATIVE SURGERY

of the Ovaries, Tubes, Uterus

By the term "conservative surgery" is meant the conserving or saving of undiseased portions of ovaries and tubes, or of portions that are somewhat affected but not enough to threaten serious trouble should they be left. A "conservative operation," then, is an operation that saves an organ or part of an organ that would otherwise (by the regular radical operation) be wholly removed. Conservative surgery of the ovaries and tubes is of rather recent development, and in order to bring it before you in its proper relation the author will recall briefly the steps preceding it.

Before the eighteenth century, operation for the removal of ovarian tumors had been suggested by a number of physicians, but it had never been put into practice. Later, the celebrated John Hunter and the equally celebrated John Bell both advocated the operation, but neither of then ventured to perform it.

The first ovariotomy in the world was performed by Ephraim McDowell, a native of Virginia, practicing in Kentucky. McDowell had attended the lectures of John Bell in Edinburg in 1749, and was convinced of the correctness of his teacher's views in regard to the removal of ovarian tumors. He returned to Kentucky and practiced his profession without special incident until 1808, when he was confronted by a case of ovarian tumor requiring operation. After giving the matter careful consideration and making full explanation to the patient, he performed the operation, and the patient recovered. From that time the practice gradually spread over the civilized world, and after half a century ovariotomy became comparatively frequent. The ovaries were removed, not only for tumors, but for all sorts of ovarian diseases, from the most serious to the most trivial. In fact, it became quite common, later, to remove practically normal ovaries for various nervous disturbances which it was thought might be due to them (Battey's operation).

After a time, however, it began to dawn upon the profession that the ovaries had another function than ovulation, and that when the ovaries were removed the patient was deprived, not only of ovulation, but also of some factor which has a marked influence on the general health. Gradually the trophic function of the ovary, explained in all details in Chapters XII and XV, was worked out. From the facts thus far established we know that, aside from the consideration of ovulation or pregnancy, an ovary should be preserved wherever possible on account of the influence it exerts over the patient's health, particularly over her nervous system.

The objects for which conservation is thus practiced in pelvic surgery are three:

1. Preservation of the possibility of **pregnancy**. To make pregnancy possible, there must be one ovary, or a functionating piece of one ovary, and a patent tube. The patent tube may be on the same side as the ovary or on the opposite side. It may be a normal tube or simply the open stump of a tube, the remainder of the tube having been removed on account of some disease (Fig. 927).

Under all these circumstances pregnancy is possible and has taken place in a number of instances. Of course, it is not as likely to take place as in a normal individual, but still the patient has a chance of becoming pregnant. Another point, sometimes overlooked, is that, even though no pregnancy results from these efforts at conservatism, the simple fact that the patient may become pregnant—that pregnancy is still possible—conduces much to her peace of mind.

2. Another effect sought by conservative pelvic surgery is continuation of **menstruation.** Even though the hope of pregnancy must be sacrificed on account of disease necessitating the complete removal of both tubes, if an ovary or functionating piece of an ovary can be left in the pelvis with the uterus, menstruation continues, though pregnancy is impossible.

3. Still another effect sought by this conservative surgery is the continuation of the **trophic influence** of the ovary. When the uterus must be removed, pregnancy and menstruation are of course no longer possible. However, if an ovary or a functionating piece of an ovary can be saved, the secretory influence of the ovary is preserved, provided the retained portion of the ovary continues its function; i.e., continues to form corpora lutea.

This latter fact must be kept in mind. The mere leaving of a portion of the ovary does not insure a continuation of menstruation or of the trophic influence. To produce the desired result, the portion of ovary left must continue to functionate. If its nutrition is so interfered with that ovulation does not continue, it is just the same as though no ovarian tissue had been left. Some time ago the author saw a woman who had been operated on in a distant city. The operator had told her that she would menstruate, as part of one ovary had been left in place. Menstruation, however, ceased entirely after the operation, and when seen by the writer she was suffering from the symptoms of the artificial menopause. She was inclined to think that both ovaries had been completely removed and to blame the operator for "deceiving" her. It was evidently, however, one of those cases in which the portion of ovary preserved had not survived in condition to continue its functions, and the patient's confidence in her former physician was restored by this explanation.

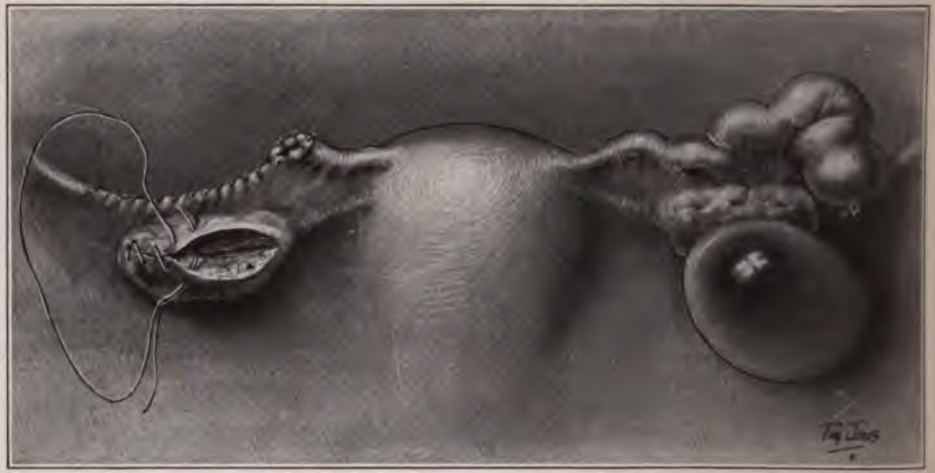


Fig. 927.—Conservative surgery of ovary and tube. Excision of damaged portion of tube, showing how the end of the stump is split and sewed open. Excision of cyst from ovary, with preservation of the unaffected portion of the organ. Lesions shown on right side and conditions after excision on the left side.

4. Another form of conservative work is the preservation of a **part of the corpus uteri** in certain myoma cases ordinarily subjected to supravaginal hysterectomy. Instead of removing all of the uterus except the cervix, the amputation of the affected portion is made so as to preserve the lower part of the corpus. Again, the uterus may be split in the median line, the tumor and affected portion removed and the remaining lateral portions, with as much endometrium as possible, preserved and sutured together. In this way the preservation of menstruation, which is an important matter in young women, may be attained in certain cases.

Conservative pelvic surgery in its various forms is still in the developmental stage. As more and more of this conservative work is done and remote results recorded, we shall be able to determine more accurately its limitations, and to say in just what conditions it is advisable and in what conditions not advisable.

CHAPTER XVIII

AFTER-TREATMENT IN OPERATIVE CASES

ABDOMINAL SECTION

The details of the care of a patient after abdominal section may be divided into (A) the regular after-treatment and (B) the care in special conditions.

(A) REGULAR AFTER-TREATMENT

First Day.—During the operation the bed which the patient is to occupy should be warmed with hot-water bottles placed under the blankets. When the patient is placed in bed the hot-water bottles are distributed about her, to maintain the heat and diminish shock. Care should be taken that there is no leakage from any bottle, and that a thick blanket is everywhere between the hot bottles and the patient. Much discomfort and even serious injury may follow a burn from a hot-water bottle, caused by the bursting of a bottle or leakage from a bottle, or a too thin protective covering between the bottle and the patient. In several instances legal complications have resulted, involving the nurse or the hospital, or the physician.

The patient's head should be low (no pillow under it) until she has recovered from the anesthetic. Keep the patient quiet and let her sleep as long as she will from the anesthesia. If the patient vomits, she should be turned well over on the side to cause the vomited material to run out of the throat, that there may be no chance of its getting into the larynx and choking her. Death may occur from this cause. To diminish the thirst, swab the interior of the mouth frequently (when the patient is awake) with cold water, either plain or acidulated with a few drops of vinegar or lemon juice.

The **orders** for the first day are usually as follows:

One quart of 3 per cent glucose and 2 per cent sodium citrate to be given, immediately on return to bed, as enema to be retained (not by proctoclysis). Codein sulphate or phosphate gr. i hypo., as necessary to give rest, may be repeated as often as every two hours.

May have water as soon as she wishes it—hot or cold, as best retained, frequently, in small amounts unless vomiting persistently.

May be propped up in bed to void. If unable to void after the usual expedients are employed (warm water to genitals, pressure on bladder, etc.) catheterize at eight hour intervals or oftener, so that not more than 12 ounces collect in bladder. Irrigate with 3 per cent boric after each catheterization.

In cases where a complete hysterectomy has been done and a retention catheter is in place, irrigate twice daily with the boric solution.

The one quart of fluid as given above is sufficient in most cases and it is well to avoid further administration per rectum unless the patient does not take sufficient by mouth.

It is not necessary ordinarily for the patient to be kept strictly on her back. After a few hours, if very tired of the one position, she may be propped partly to one side or the other occasionally. But she must not be allowed to develop that restlessness that insists on constantly changing from one side to the other in an endeavor to find a comfortable position. No position is very comfortable under the circumstances and the too frequent changing increases the discomfort.

The patient should be quieted as much as possible without medicine, in order that the administration of sedatives may be avoided or kept within small amount. The nurse can do much by arranging the patient comfortably in bed and directing her frequently to keep the eyes closed and to nap as much as possible. If there is such severe pain that the codeine does not give rest, morphia, in 1/6 gr. doses, may be given, but that is rarely necessary. If preferred, the sedative may be given by suppositories, but its effect is not so prompt and cannot be so accurately graduated.

As a rule the author prefers to let the patient have water in small doses as soon as she wishes it. It diminishes the thirst and helps to supply the system with needed fluid. Occasionally vomiting does no harm; rather it is beneficial in that it helps to clear out the ether-saturated mucus, the retention of which increases stomach irritation and disturbance.

If there is persistent vomiting, and especially if there is persistent epigastric pain, a stomach-tube should be introduced and the stomach washed out with a quart of normal saline solution. This stomach washing (lavage) has come to be recognized as a most important measure in postoperative treatment. It is the only effective treatment for the serious complication of acute dilatation of the stomach, and in any case of persistent stomach irritation it adds much to the patient's comfort by clearing out the irritating material.

Instead of the large tube the smaller duodenal tube may be used. It has the advantage of being easier for the patient to take, being swallowed without much difficulty; and in the cases of persistent vomiting and dilatation of the stomach it may be left in place and washing done every hour until the stomach begins to empty itself. Lavage should be resorted to promptly when indicated and because of the minimum discomfort of the small tube one will not hesitate, hoping the vomiting will cease after a few hours, as is the case with the regular stomach tube.

If the patient cannot take water by mouth, the thirst may be diminished by saline solution per rectum by the drop method (proctoclysis). If the patient is in shock, start the proctoclysis and employ the other measures for that condition.

Second Day.—During the second day the orders previously given are continued unless there is some special reason for modifying them. The patient may take water more freely, and the liquid nourishment is now begun and gradually increased as the stomach will bear it. For this purpose any liquid except milk is permissible; broths, albumin water, fruit juices, tea, etc., as best retained by the patient.

If the patient has to be catheterized, it is well to give some reliable urinary antiseptic to diminish the danger of cystitis. If gas in the intestines is troublesome, a rectal tube may be introduced. If the operation was an emergency one, where there was no opportunity for preliminary preparation of the intestinal tract, it may be advisable to secure a bowel movement within the second twenty-four hours in which case an enema of mag. sulphate oz. i, glycerine oz. ii and water oz. iv may be given. This may also be used in those cases where the rectal tube does not relieve the gas pains and distention.

Third Day.—At the beginning of the third day start the patient on the purgative regimen, indicated below, that a bowel movement may be secured sometime during this twenty-four hours.

The **orders** for the third day are usually about as follows:

Magnesium citrate oz. iv and repeat after two hours. If no bowel movement after four hours give the magnesium sulphate and glycerine enema. Continue the codein as necessary to give rest.

In those cases where there has been persistent vomiting or distention, calomel in ¼ gr. doses given every half hour for eight doses seems to be better retained and more effectual so far as the distention is concerned than the mag. citrate.

Continue urinary antiseptic.

It should be remembered, however, that no cathartic should be given until vomiting has ceased and flatus has been expelled either with the rectal tube or enemata, because persistence of vomiting and distention that cannot be relieved is always suggestive of obstruction, due either to paralysis of the bowel or some other mechanical factor, kinking, adhesions, etc.

The proctoclysis, if it is being used, should be stopped as soon as the patient is taking sufficient fluids by mouth, as indicated by the output of urine, as in some cases the rectal irritation may keep up vomiting.

Fourth Day.—Ordinarily by this time one or two good bowel movements have been secured, and the patient has become fairly comfortable. If the kidneys are secreting well, the proctoclysis may be stopped. All medicines may now be given by mouth. The patient may be propped up as necessary, to aid in urination if she is not already urinating. Some semisolid and solid articles of diet (custards, breakfast foods, toast, crackers, bread, etc.) may be allowed. As a rule, no sedative is now necessary, except an occasional dose of sodium bromide when the patient is particularly restless at night. It is well to start the patient on some good iron tonic, for these patients are usually anemic. The elixir of iron, quinine and strychnine, given in teaspoonful doses after meals, does well for most cases. If preferred, Blaud's pills or some of the numerous organic iron preparations may be used.

The **orders** given at this time may serve as standing orders, to be continued as long as the patient is in the hospital, except when modified for some special indications. They are about as follows:

Light diet, with extras. Push the nourishment. Give an abundance of water and liquid nourishment. Articles from the regular diet may be added as desired.

Continue the iron preparation.

Continue the urinary antiseptic.

Mild laxative (phenolphthalein, cascara, etc.) at night as needed. Give an enema when there is no bowel movement during the day.

Subsequent Orders.—The *care of the bladder* is an important item after pelvic operations. The urinary antiseptic should be continued until danger of urinary infection is passed—ordinarily about a week after the bladder is emptied spontaneously. Curtis (Jour. Am. Med. Assn., June 22, 1918) demonstrated that unsuspected residual urine is the most common cause of postoperation cystitis. Ordinarily, after being catheterized a few times the patient begins urinating spontaneously and it is supposed that she is emptying the bladder each time. Catheterization of these patients immediately after urination showed that a large proportion of them did not empty the bladder completely for several days after the beginning of spontaneous urination. This residual urine, though small in amount, invited bacterial activity with consequent troublesome symptoms which in some cases persisted for months after the operation. When a patient has to be catheterized at all after operation, catheterization with the accompanying irrigation should be continued at least once daily, immediately after urination, until all residual urine disappears. By following this plan, Curtis was able to practically eliminate postoperative bladder troubles.

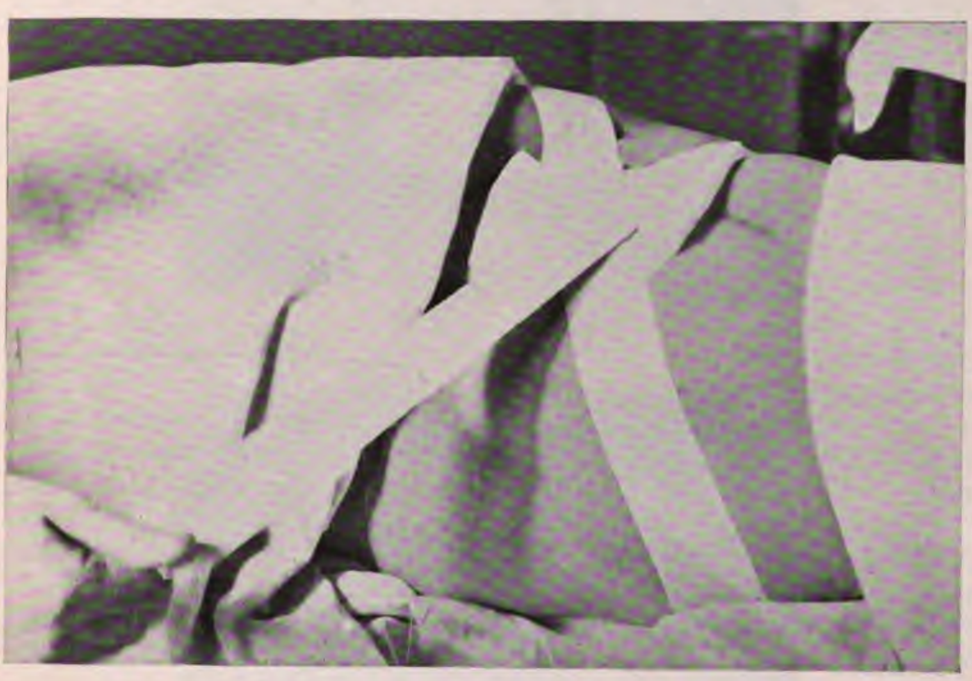


Fig. 928.—Strapping the abdomen after removing the sutures.

The **diet** is gradually increased until the patient is taking regular diet with extras. She should continue to take liquid nourishment between meals. During convalescence the patient does not take and digest sufficient food; the digestive powers may be increased by massage, salt rubs, passive movements and resisted movements, judiciously administered by a competent nurse. The careful carrying out of the regular nursing given bed patients (including the daily morning bath and evening alcohol rub) is also an important factor in causing the patient to be comfortable and to rest well at night, and to digest her food promptly. If there is any decided digestive disturbance, some remedy for that should of course be given.

Removing the Sutures.—Unless there is some indication of irritation in the wound, the dressing is not to be disturbed for ten days. Then it is taken off and the sutures removed. The wound is now healed. The vicinity of the wound is dusted freely with boric acid powder, a smooth piece of gauze (several thicknesses) is laid over the scar, and the abdomen is strapped with strips of two-inch adhesive plaster (Fig. 928) in such a way as to take the strain from the newly healed wound. Four to six strips are put on so as to give firm support. Then a piece of cotton is placed over all and the binder reapplied.

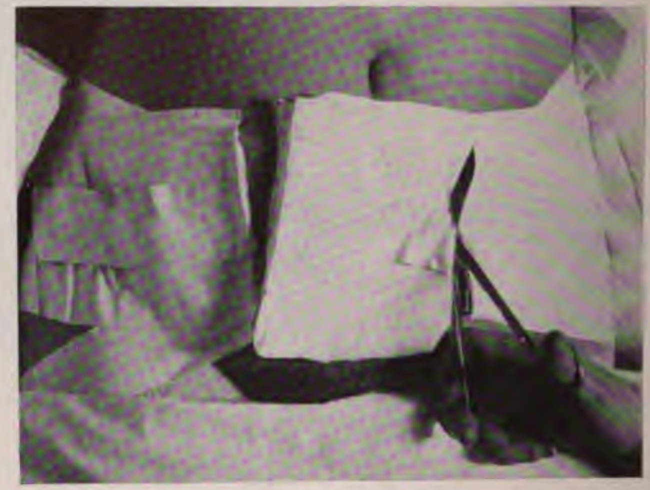


Fig. 929.—Cutting the plaster, so as to inspect the wound and change the gauze, without removing the other part of the plaster.

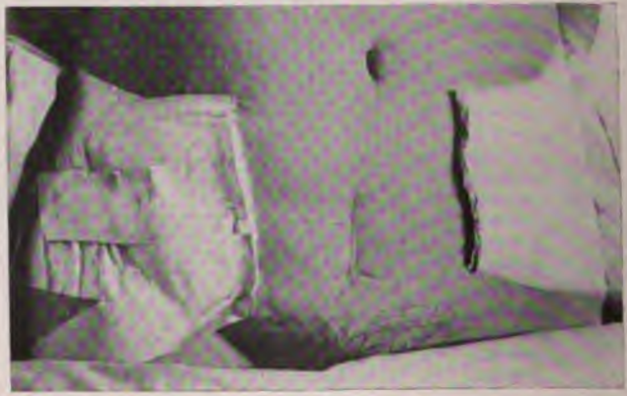


Fig. 930.—Method of exposing the wound as often as necessary for change of dressing, without causing the patient the discomfort of repeated removal of plaster from the skin. In each restrapping the new plaster is put over the old.

The adhesive strips are usually left undisturbed for about a week. If it is desired to look at the wound area, because of irritation along the suture tracts or for other reason, the adhesive plaster is cut along the edges of the gauze (Fig. 929) and the gauze removed so that the scar and vicinity are exposed (Fig. 930). After the required treatment, gauze is again applied and then new plaster put on, the ends of the new plaster adhering to the old plaster at each side. This permits inspection of the wound area as often as desired without the discomfort of repeated removal of plaster from the skin.

Ordinarily, however, the adhesive strips need not be disturbed for a week. In the meantime a well-fitting corset, preferably the one she is accustomed to, is adjusted to the patient. It is well to leave the adhesive strips on until the patient reaches home, as they serve as an additional protection during the extra exertion of the trip. After the patient reaches home and the corset has become comfortably adjusted, the adhesive strips are taken off. The corset is to be worn for about three months, but only when the patient is up and about. It may be taken off at night. Some authorities recommend that no abdominal support or binder be worn. But while most patients get along very well without it, the author feels that it is a precaution which it is well to employ. It is of decided benefit in some cases (where the abdominal wall is lax and protuberant); it adds to the patient's comfort in most cases, it reminds the patient of the necessity of avoiding overexertion in all cases, and it does no harm in any case if waist constriction be avoided.

Sitting Up, Walking.—Unless there is some special reason for hurrying the patient to the sitting posture, she should be allowed to remain quiet and in the recumbent posture for the first few days. After the bowels have moved well, the patient should be encouraged to move about in the bed and to be propped up as much as she likes—more and more each day—so that by the end of the first week she is sitting up straight in bed. By the eighth or ninth day she may sit on the edge of the bed and be out of bed on the tenth day. The advantages of this early moving about in the bed and early getting up are better circulation (less "bed-weakness"), and consequently better repair of wounds, better digestion and quicker restoration to normal condition.

It is not advisable, however, to get the patient up too early, while Nature is still fully occupied with the acute repair work of the first few days. The feeling of the patient is, as a rule, the best guide as to when to begin activity. The plan just described is decidedly preferable to the "hurry up" method of getting the patient out of bed in one to two days, which was recently so popular with some. In cases where the patient will be benefited by further rest, do not hesitate to keep her in bed two weeks, or even longer. In many instances the patient is greatly debilitated and literally "worn out" by chronic sepsis or by months of suffering and ill-health, or by heroic work for her children in spite of failing strength. In all these cases, the enforced rest in bed may be an important aid in restoring the patient's health.

If the abdominal wall is found lax and atonic, as is so frequently the case, the "raising exercise" described in Chapter III (Fig. 232) should be ried out regularly night and morning for several months after operation.

It may be begun before the patient leaves the hospital or as soon thereafter as she finds she can carry it out without discomfort.

After the patient has returned to her home, the tonic medicines and regimen should be kept up for three to six months, as necessary, to put the patient in first-class general health.

(B) SPECIAL CONDITIONS

1. **Drainage Cases.**—When a **hard rubber tube** is left extending into the pelvis for drainage, a large piece of sterile sheet-rubber is usually slipped over the end of the tube to keep the fluid that comes out of the tube from soiling the gauze on the abdominal wound. A small wick of twisted gauze is then passed to the bottom of the tube to aid in the drainage. This twisted wick should be small enough to leave plenty of room around it inside the tube to permit the discharge to come out. Some pieces of gauze are now placed over the end of the tube and the piece of sheet-rubber is folded over the gauze from all sides. The whole is then covered with a large piece of sterile cotton and the binder applied, taking care to avoid pressing on the tube. This is the technic ordinarily employed in the dressing at the time of the operation.

The frequency with which the drainage tube must be dressed varies with the amount of drainage fluid. In chronic cases, where the pelvis is left fairly dry, the amount of fluid is usually small. It is well to dress the tube within three to six hours, or before if there is a probability of much oozing or secretion. The frequency of the subsequent dressing is regulated by the amount of fluid found. The idea is to change the dressing before all the gauze confined in the rubber-dam becomes filled with absorbed fluid. Usually every eight to twelve hours is sufficient for the first two days and after that once daily.

In cleansing and dressing the tube the strictest asepsis must be observed. The instruments needed are simply a long probe or applicator, for pushing the gauze wick to the bottom of the tube, and a scissors for cutting the gauze. These instruments should be boiled, and in addition to the ordinary disinfection of the hands it is well to wear sterilized rubber gloves (Fig. 931). After the preparation of the instruments and of the physician's hands, the binder and outer part of the dressing are removed by the nurse, thus exposing the sterile sheet-rubber. The physician then unfolds the sheet-rubber and removes the gauze therein and also the saturated gauze wick in the tube. Another gauze wick is then twisted, taking care to remove all loose ravelings. The end of this sterile wick is then pushed to the bottom of the tube and left there for a minute to absorb the discharge. It is then removed and a fresh one introduced. This process is repeated until all the fluid in the tube is removed. A fresh wick is then introduced and gauze is placed about the end of the tube, and the sheet-rubber folded over as before. The inner surface of the rubber-sheeting should be cleansed with some reliable antiseptic solution (e.g., bichloride, 1-2000) and the interior of the tube may be cleansed with a gauze wick wrung out of the same solution. Also, the tube should be raised slightly and rotated once daily, in order to prevent injurious pressure on the rectum (which might cause perforating ulceration) and to prevent stopping-up of the drainage holes by omentum or bowel, or exudate.

The tube is removed when the collection of fluid in the pelvis ceases—that is, in two to five days. In suppurative cases the secretion, of course, keeps up indefinitely. In such a case, the tube is left in until all acute threatening symptoms have disappeared and until a good wall has formed about the tube tract, shutting it off from the general peritoneal cavity. It may as a rule be removed in four to six days, and a small rubber tube or piece of gauze inserted into the tract to keep the outer end open until it closes from the bottom. The treatment of such a tract is to keep it clean by cleansing (daily or less frequently, as needed) with hydrogen peroxide, keeping the outer end open as mentioned, and protecting it from secondary infection by an antiseptic dressing. It is well to keep some antiseptic drying powder (e.g., boric acid) dusted freely on the wound about the drainage tube.

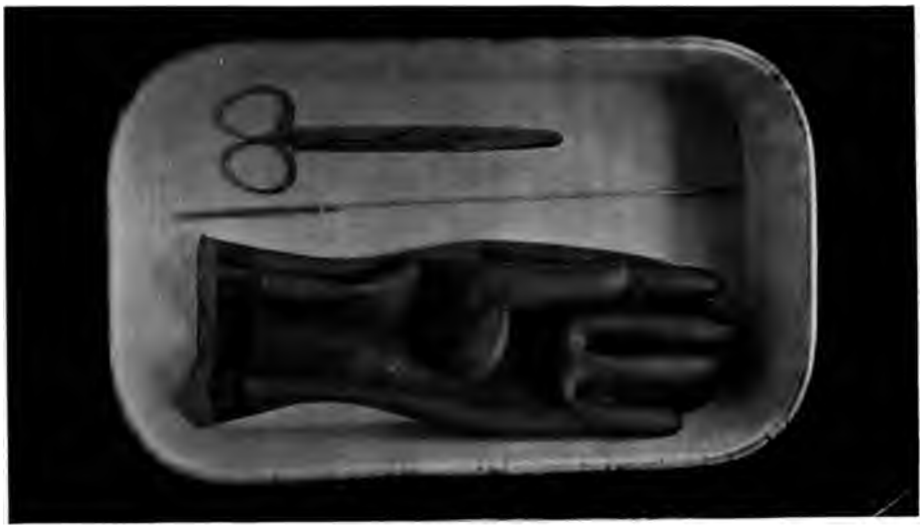


Fig. 931.—Dressing the drainage tube. Articles required—applicator, scissors and pair of rubber gloves.

In acute cases, where there is virulent infection and free secretion, the tube must be cleansed very frequently—as often as every two or three hours at first. In these cases, where the fluid is abundant, the removal of it from the tube is preferably accomplished with a syringe. A very convenient arrangement for this purpose is the ordinary hard rubber syringe with a soft rubber catheter attached. It is more convenient to handle when only two-thirds of a catheter is used, as shown in Fig. 796. In the very acute cases, where drainage in various directions is required and it is necessary to leave the wound partly open, the whole dressing soon becomes soiled with the discharge and consequently must be changed frequently. In fact, in some of these cases it is advisable to employ warm moist dressings (wrung out of normal saline solution or boric acid solution, 3 per cent) all over the abdomen and wound, the moist dressing to be changed every few hours, or as often as it absorbs a considerable amount of the septic discharge.

When **rubber tubing** is used for drainage, it may be used alone or with gauze around the tube or as the "split-tube with gauze." In the latter a piece of large rubber tubing is split longitudinally and a small wick of twisted gauze laid inside, but the gauze wick must be small enough to permit the free escape of fluid through the tube. Rubber-tube drains are left in until the necessity for drainage has disappeared and the drainage tract is largely closed from the bottom. Where the rubber tube is of large size, it is removed after a few days and a smaller size introduced.

When **gauze** is used for drainage, alone or with rubber tubing, it is removed usually in two to four days.

In all drainage cases, except where the patient is in severe shock, the upper part of the body should be raised higher than the pelvis, so as to cause all septic fluid in the peritoneal cavity to gravitate to the pelvis, where it is removed through the drainage tube. Immediately after the operation raise the head of the bed about two feet. After the patient has recovered from the anesthetic she may be propped up in the half-sitting posture (Fowler posture).

In acute septic cases normal saline solution should be used freely per rectum, as described in Chapter X.

2. **Uterine Replacement Cases.**—The principal special point in the care of the patient after any operation for fastening the uterus and adnexa forward, is to see that the bladder is not allowed to fill sufficiently to force the uterus backward again in the first few days following operation. If the patient cannot urinate, she should be catheterized often enough to prevent injurious distention.

3. **Severe Shock.**—When the patient is in severe shock, the head should be lowered by the elevation of the foot of the bed about two feet, except in those cases where there is danger of spreading pus from the pelvis to the upper part of the uncontaminated peritoneal cavity.

Give the patient digitalin 1/30 gr. every two hours and strychnine sulphate gr. 1/40 every four hours until reaction comes on. On account of the slow action of the digitalin it is well also, if the patient's condition is grave, to give some of the quicker acting stimulants, such as camphor in oil or caffein and sodium benzoate each 2-3 grains, and repeat as necessary. Still more important is the free use of normal saline by proctoclysis, hypodermoclysis, or intravenously. Glucose in 10 per cent solution is also very valuable. Three hundred c.c. may be given intravenously every 4 to 8 hours as necessary. If the shock is primarily due to hemorrhage, transfusion is indicated. The use of oxygen is an additional measure of value where respiration is defective.

The hot-water bottles must be renewed as necessary to keep the patient warm, and the proctoclysis and other treatment should be given in such a way as to avoid chilling of the surface.

4. **Internal Hemorrhage.**—A serious internal hemorrhage is indicated by

rapid weakening of the pulse, an increase of pain in the abdomen and subnormal temperature. It is rare after the first twelve months, and usually comes within the first six hours. If there is a drain through the abdominal incision or into the vagina, there will be a free flow of bloody serum, or, if it is a tube drain, of blood itself.

The treatment of a slight hemorrhage is (a) to elevate the pelvis by raising the foot of the bed, (b) to put an ice bag on the pelvis outside the dressing, (c) to keep the patient perfectly quiet on her back, and (d) to give a sedative (codeine) if necessary to secure rest. Discontinue the normal saline enemata, as the pelvic disturbance occasioned thereby may increase the hemorrhage or start it after it had once ceased. Do not give any stimulants or employ any measure that will increase the blood pressure. The hope is that, as the blood pressure is low, the bleeding will cease for a few hours—long enough to permit effective clotting to take place in the oozing area. In twenty-four hours such clots become so firm that a renewal of the bleeding is not probable.

When the hemorrhage is severe, the abdomen should be promptly reopened (if the patient is seen in time) and the bleeding vessel caught.

5. **Persistent Vomiting.**—To make the nausea and vomiting as slight as possible, the patient's head should be low (no pillow) for several hours after anesthesia. For the first day the patient should be kept perfectly quiet, with the eyes closed most of the time, so as to nap as much as possible. The nausea is increased by talking or by even looking about. If a visitor is allowed, it should be for only a few minutes and there should be but little talking. When water is begun, it is preferable usually to give hot water, in tablespoonful doses and frequently, though some patients retain cold water very well from the first. When the nausea and vomiting is such that the patient cannot rest, give codeine phosphate, ½ to ¾ gr. hypodermically, and repeat after three hours, as necessary to give rest.

The most effective measure for overcoming vomiting, persistent nausea, and stomach distress generally is washing out of the stomach with normal saline solution, as previously described. After the bowels are well opened the vomiting usually ceases unless there is some serious complication, such as beginning peritonitis or intestinal obstruction, both of which are mentioned later.

6. **Acute Dilatation of Stomach** is a serious complication that may develop any time after operation, but especially within the first sixty hours. The patient complains of persistent pain in the epigastric region, and this region becomes more or less distended. The pulse becomes rapid and weak without apparent cause. There is usually nausea and vomiting, but the most constant and characteristic signs are the persistent epigastric pain and the failing pulse. The anatomic change is overdistention of the stomach with gas, due to different causes in different cases. In the majority of cases it is probably due to some displacement of the stomach, with kinking and obstruction at the pylorus. As the gas cannot escape, its continued accumulation

becomes a serious matter, and in several instances death has resulted from overdistention of the stomach caused thereby.

The treatment for this condition is prompt introduction of the stomach-tube, to permit the gas to escape, and irrigation of the stomach with normal saline solution to remove all decomposing material and prevent reaccumulation of the gas. This complication should be watched for and recognized, and the stomach-tube used before it reaches a serious stage. If the trouble recurs, several stomach washings may be required. It is well also to vary the patient's position, so as to overcome displacement of the stomach and dragging on its supports. In some cases it seems that the Fowler posture before patient has completely awakened from the anesthesia, becomes a factor in the development of this condition.

7. **Kidney Insufficiency** is more easily prevented than treated after it once develops. The preventive measure is to make sure that the kidneys are doing their work well before operation. The treatment for kidney insufficiency after operation consists in the free administration of normal saline solution by proctoclysis, in elimination by means of free bowel movements, and sweat packs and such other measures as are used for the regular treatment of uremia. In urgent cases, the normal saline solution may be given subcutaneously or even intravenously.

8. **Constipation and Intestinal Paralysis.**—When the purgative measures given previously under the regular after-treatment, fail to cause bowel movement, the loss of function may be due simply to temporary paralysis of the bowel or to intestinal obstruction or to beginning peritonitis. Unless there are decided evidences of mechanical obstruction or of peritonitis, it is to be assumed that the trouble is temporary intestinal paralysis (adynamic ileus) and treatment for the same is begun. This condition is one of the most serious of postoperative complications. It is due to the paralysis of a segment of the small intestine which, due to the lack of peristalsis, prevents the passage of the intestinal contents past this point. The results are the same as obstruction from kinking, adhesions, etc. There is the persistent vomiting, becoming fecal in the late stages, the distention not relieved by usual measures, and later the toxemia from absorption from the distended bowel. Peritonitis is easily ruled out early. Paralysis may be confused with obstruction from other causes and the differential diagnosis is difficult.

The treatment consists in repeated washing of the stomach, and it is here that the duodenal tube left in place is of great value; repeated enemas such as magnesium sulphate oz. i, glycerine oz. ii, water oz iv, S.S. enema with 1-2 dr. turpentine, saturated solution magnesium sulphate oz. vi, either alone or with oz. vi olive oil. Milk of asafetida, oxgall and others may be tried.

No cathartics, pituitrin, or eserin should be given until vomiting has ceased and the distention is relieved or a bowel movement has been secured by enema. The use of cathartics, pituitrin, etc., only further exaggerates the reverse peristalsis which is already present, and if there is a mechanical obstruction, tends to make it more complete.

If the above measures are unsuccessful, the patient's condition gradually but rapidly grows worse, and operation should be resorted to before all hope is gone. The operation for this condition can be done under local anesthesia and consists in doing an enterostomy, always being sure to get a distended loop of bowel.

9. **Intestinal Obstruction** is indicated by the combination of persistent vomiting, absence of bowel movement in spite of the use of the purgative measures already mentioned, severe cramp-like pains in the abdomen recurring every few minutes, a serious rise in the pulse rate, and the absence of fever, such as would be caused by peritonitis of sufficient severity to give rise to other symptoms. Later there is fecal vomiting. Such a combination of symptoms calls for immediate reopening of the abdomen, and relief of the obstruction. Unless this is carried out promptly, there will develop a peritonitis which, in combination with the obstructive trouble, is very likely to prove fatal in spite of later operation.

10. **Peritonitis** is indicated by the combination of symptoms consisting of fever (beginning or increasing after the second day), persistent vomiting (extending into the fourth and fifth days), serious increase in the pulse rate, steady pain in the abdomen (without the cramp-like pains of intestinal obstruction), and an increasing tenderness and rigidity in the lower abdomen, which gradually spreads to the upper abdomen. The intestinal tract is usually sluggish (partial intestinal paralysis), but there is not the complete absence of bowel movement, such as is seen in intestinal obstruction.

A rise of temperature within the first twenty-four hours after operation is not of serious significance. Not infrequently in extensive operations, involving large peritoneal or connective tissue surfaces, there is a sharp rise of temperature (up to 102° or 103°), coming on within twenty-four hours and subsiding the second or third day without further disturbance. In the absence of a more definite explanation, this "aseptic rise of temperature" is said to be due to the "absorption of blood ferment." But when there is a rising temperature after the second day, it is indicative of some unusual disturbance, and when the combination of symptoms above mentioned is present, the diagnosis of peritonitis is clear.

The treatment of peritonitis following operation is the same as for peritonitis without operation. This has already been described under Acute Pelvic Inflammation (Chapter X).

11. **Local Suppuration** is indicated by fever, coming on after the sixth day, and a moderate increase in the pulse rate and localized pain. If the suppuration is deep in the pelvis, the patient complains of deep-seated pain and usually of backache or of pain extending down one thigh. If the inflammatory focus is situated in the back part of the pelvis, bowel movement or the giving of an enema causes pain. Vaginal examination shows a boggy mass, which is very tender. The treatment for such local inflammation deep in the pelvis is to secure good bowel movement, to make the patient comfortable, to increase tissue resistance and to await resolution or abscess formation. When fluctuation can be detected by vaginal examination, open

and drain the abscess per vaginam. Exceptionally, it may be advisable to open into a solid mass (inflammatory focus without fluctuation) or to open into the culdesac for general pelvic drainage.

When the suppuration is in the abdominal incision, there is increasing pain along the course of the incision. This calls for removal of the dressing and inspection of the wound. Inflammation at this point, is indicated by the cardinal signs (pain, heat, redness and swelling), localized at some part of the incision, or extending all along it. If the disturbance is slight, a hot moist antiseptic dressing, changed every twenty-four hours, may be sufficient. If there is a pronounced cellulitis at some point, that portion of the wound should be opened superficially and a gauze or tube drain put in and the hot moist dressing applied. If drainage of the infected area can be satisfactorily effected without removing the tension sutures, that is preferable. In some instances the inflammation is confined to the subcutaneous tissue and no disturbance of the deep buried sutures is necessary. The important point, however, is to secure free drainage of the infected area and prevent serious absorption. If the whole wound is infected, it must all be drained. In such a case, the whole wound (except the peritoneum) is likely to open. As soon as serious absorption has ceased, the sides of the wound are brought together by strapping with adhesive strips, the wound being exposed and cleansed every day or two (depending on the amount of discharge) with hydrogen peroxide. Later, if thought preferable, the granulating surfaces may be freshened by curetting and then brought together by sutures, with the idea of securing secondary union.

12. **Phlebitis** seldom occurs now, since patients are allowed out of bed earlier. When it does appear, it is usually in about the third week, when the patient has passed the time for the ordinary operative complications and is congratulating herself that she will soon be entirely well.

She complains of pain in the groin and upper part of the thigh on one side, and the temperature gradually rises to 102° or 103°. There may or may not be swelling of the foot and leg, but there is always tenderness on pressure over the femoral vessels just below Poupart's ligament. This tenderness may, in some cases, be traced a considerable distance down the thigh, and also up along the iliac vessels.

The treatment of phlebitis is immediate bandaging of the leg and thigh (from toes up), elevation of the leg in a comfortable position on pillows, and the maintenance of this position and of the dorsal posture for several days. In mild cases the measures mentioned usually relieve the spontaneous pain, but in the severe cases sedatives may be necessary for a time to give rest.

It will be necessary to maintain this position most of the time for a week or more, depending on the severity of the trouble and the rapidity of the improvement. When the above treatment is carried out promptly and persistently, serious trouble seldom results. If the patient is permitted to use the leg, the suffering is increased and the disability prolonged, and there is danger of serious embolism by particles detached from the thrombosed area in the vein and carried to the brain or heart or lungs. On account of the danger of detaching emboli, no massage or rubbing of the involved area is permissible until some time after all acute symptoms have subsided.

Getting patients out of bed early (at the end of a week) has almost eliminated this complication also in the author's personal experience. Under the old regimen of keeping the patients in bed three weeks it was rather frequent, occurring in about two per cent of the abdominal operative cases.

13. **Pain During Convalescence.**—Aside from the conditions already mentioned and the natural soreness of the recently disturbed structures, pain during convalescence is usually due to gastric or intestinal indigestion, with gas formation and resulting painful intestinal peristalsis. The treatment for this condition is to remove the irritating material from the intestinal tract by an enema and laxatives, and, if necessary, administer some remedy for the gastric or intestinal indigestion. Of course, operated patients are subject to neuralgic and neurasthenic pains the same as other individuals, and these are likely to be more pronounced at the menstrual time.

An abdominal operation often causes the menstrual flow to appear ahead of time. Not infrequently there is also a slight bloody flow from the uterus, without any relation to menstruation, within a few days after the operation. Such need occasion no alarm, as it disappears in a short time.

14. **Subsequent Disturbances.**—As the patient begins to walk about, there may be more or less **soreness** in the pelvis for some time, until the hyperemia of the healing tissues has disappeared and the new connective tissue is firm.

In drainage cases a **sinus** sometimes persists. The persistence of such a sinus may be due to sloughing tissue or to a ligature. In the case of a catgut ligature or sloughing tissue, the troublesome material will usually disintegrate and come away in the course of some weeks. The sinus-track, in the meantime, should be kept clean by frequent cleansing with hydrogen peroxide—every day or two, depending on the amount of discharge. The patient can care for the fistula at home after being shown how to apply the peroxide and the dressing.

If a silk ligature is at the bottom of the sinus, it may come out itself after some weeks or months, or it may have to be taken out. Sometimes it may be caught up by "fishing" with a silkworm-gut or other contrivance. Otherwise, it must be removed by operation. A rare cause of persistent fistula is a sponge or forceps left in the cavity.

Occasionally a **fistula** connected with the bowel follows abdominal section. Ordinarily such a fistula should be treated by a simple cleansing for some time, for in a considerable portion of the cases it will heal spontaneously within a few weeks. If it persists indefinitely, it requires operative treatment. Such an operation should not be undertaken lightly, for it may prove very difficult and dangerous.

A **hernia** in the scar indicates defective healing of the wound. This is usually due to the necessity for drainage, which prevents perfect approximation of the sides of the wound. If the hernia is small, it may in some cases be held back satisfactorily by an abdominal supporter. If large, or if persistently troublesome even though small, it requires operative treatment.

The **nervous disturbances** coming after removal of the ovaries, like those seen in the natural menopause, are of two types, (a) the vasomotor symptoms from endocrine disturbance and (b) the incidental psychoneuroses. The *vasomotor* disturbances, consisting of hot flushes, dizziness, cold extremities and erratic variations of feeling, occur in the great majority of cases. They last usually two to three months and are not a serious matter. They are not due to increased blood pressure, for often it is not increased. General irritability of the nervous system may prolong them, as may also local disturbance. Graves has noted that complicating hernia, adhesions and especially prolapse of the cervical stump and vaginal walls, have this effect. These vasomotor disturbances are due to the cessation of ovarian internal secretion, and corpus luteum or ovarian tissue is a specific for them. Where both ovaries have been removed, it is well to begin giving corpus luteum while the patient is still in the hospital and to continue it off and on for several months. If ordinary administration does not secure sufficient effect, hypodermic administration later is advisable.

The *psychoneuroses* are not due definitely to loss of the ovaries, but to the general condition of the nervous system and especially to the exhaustion of long-continued disease. The operation usually improves these disturbances by checking the exhausting influence. In some cases, however, the additional strain of operation aggravates the symptoms temporarily. This temporary aggravation is likely to be increased or prolonged if persistently painful complications develop. A like prolongation may be caused in receptive individuals through mental suggestion occasioned by the remarks of friends as to the effects of such operations. These disturbances require psychoneurotic treatment, the same as when occurring unassociated with pelvic operation.

AFTER-TREATMENT IN VAGINAL OPERATIONS

The general after-treatment of vaginal operations is practically the same as for abdominal operations.

A lysol douche ¼ per cent, once daily, is started on the third day. If there is a drain from the peritoneal cavity into the vagina, the douche should be given under very low pressure, making sure that there is a good return flow. By the end of a week the drain will have either come away of itself or be loosened so it can be easily removed. The douches are continued as long as the discharge continues. It is but seldom necessary to replace the drain.

After a vaginal or perineal operation the vulva and adjacent surfaces must be kept covered with an antiseptic dressing, the same as any other wound region. Here, however, on account of the necessity of evacuation of the bowel and bladder, the problem of wound protection is more complicated. The dressing must be changed several times daily and with each change of dressing there is danger of contamination.

When it is necessary to change the dressing, the nurse should disinfect her hands and then cleanse the operative field with an antiseptic solution (e.g., bichloride 1-5000). The cleansing may be conveniently accomplished by means of the "pitcher douche" (Fig. 932). After the cleansing, a fresh dressing is put on and the T-bandage again applied (Fig. 933).

If the patient can pass the urine, she should ordinarily be permitted to do so, whatever the character of the vaginal work. Catheterization is more likely to do harm than urination, especially as the urine remaining on the genitals is at once removed by the cleansing solution. To aid spontaneous urination, patient may be propped up, hot packs on the vulva may be used, and also firm pressure over the bladder as the patient is trying to urinate. Hot douches also aid some, and may be used if there is no contraindication. In some instances pituitrin, given hypodermatically, will successfully overcome the retention.

In many cases, however, the patient cannot urinate at first, and must be catheterized for two or three, or more, days. Catheterization must be carried out under strict antiseptic precautions. The catheter is boiled, the nurse's hands are disinfected, and the vestibule and meatus of the patient are carefully cleansed with an antiseptic solution. After the labia are once separated and the vestibule cleansed, the labia must be kept separated, so that there is no recontamination of the vicinity of the meatus, until the catheter is introduced (see Fig. 934). Care should be taken to avoid touching the part

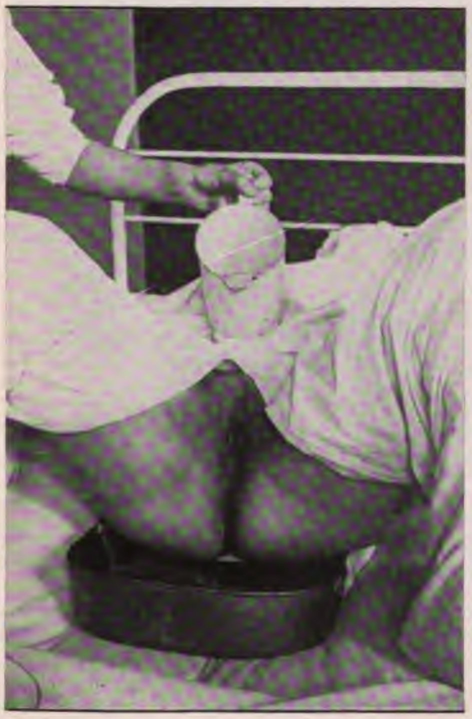


Fig. 932.—Cleansing the external genitals. The use of the "pitcher douche."

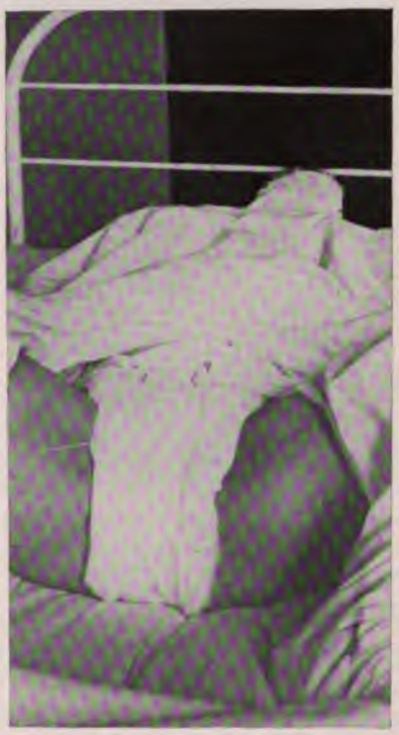
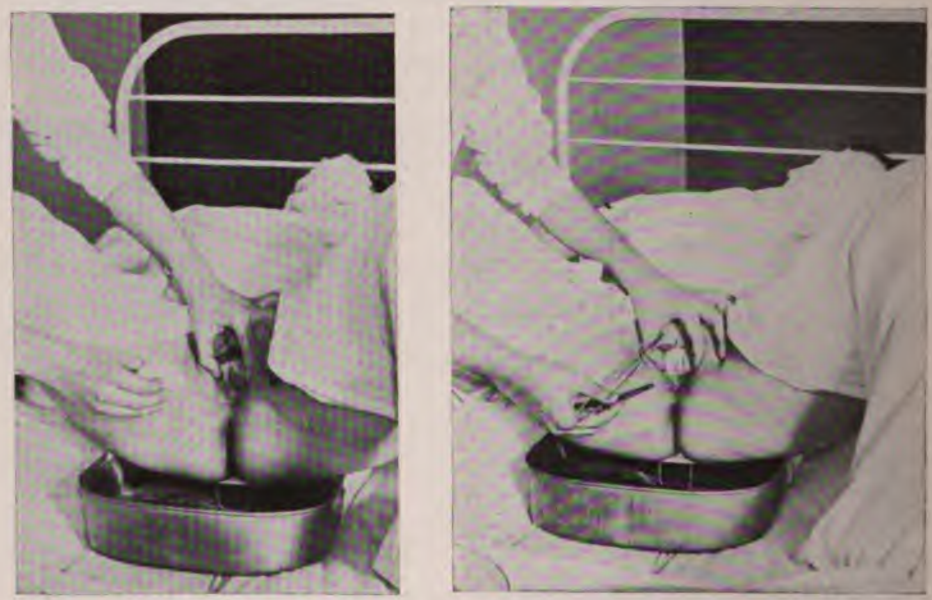


Fig. 933.—The vulvar dressing applied. This dressing should be large enough to cover all the adjacent surfaces, including the pubic hairy region, and should be kept spread out by a wide T-bandage.

of the catheter which enters the bladder. The catheter should be grasped well back from the point, as shown in Fig. 934-B. In order to prevent cystitis, it is well to give the patient some reliable internal urinary antiseptic while she has to be catheterized and for several days after the urine is passed.

Where repeated catheterization is necessary for several days it is better to fasten an ordinary soft rubber catheter in place with adhesive and keep the bladder drained for forty-eight hours. When the catheter is removed after this time most patients will be able to void. However, as previously mentioned, catheterization with the accompanying bladder irrigation should be carried out at least once daily immediately after urination until all residual urine disappears.



A. *B.*

Fig. 934.—Catheterization. *A.* After the nurse cleanses the vestibule as here indicated, the labia must be kept spread apart until the catheter is introduced. When the labia are allowed to drop back over the meatus after cleansing, the meatus must be again cleansed with the antiseptic solution before the catheter is introduced.

B. After the catheter is boiled, do not touch the point with the fingers. The catheter is grasped well back from the point, as here shown, and the point is introduced into the urethra without touching the labia or the fingers. A glass catheter or a soft rubber catheter may be used, as preferred.

For the **After-treatment of Pelvic Abscess,** see Chapter X.

For the **After-treatment of Perineorrhaphy,** see Chapter V.

For the **After-treatment of Trachelorrhaphy,** see Chapter VI.

For the **After-treatment of Curettage,** see Chapter VI.

CHAPTER XIX

MEDICO-LEGAL POINTS IN GYNECOLOGY

There are various conditions connected with the genital organs concerning which the physician may be called to testify in court or to give a written opinion.

Such testimony is, generally speaking, simply the recitation of facts in anatomy, physiology, pathology, symptomatology, diagnosis, treatment and prognosis, with which the physician is necessarily more or less familiar because of his daily work. But there are certain things, of little or no value in the ordinary diagnosis and treatment of diseases, which assume much importance when the case comes into court. So, when called to attend a case in which there is any probability of court proceedings, the facts that are of medicolegal importance should be given considerable attention.

Some of these facts in connection with certain subjects that frequently find their way into court will be pointed out here.

RAPE

Rape is defined as "the unlawful carnal knowledge of a woman without her consent," and again, more in detail, as "sexual intercourse with a woman effected by violence, or with a young girl by abuse of her ignorance."

Medical evidence is ordinarily required to confirm or disprove the statement that rape has taken place. False accusations of rape are very frequent. Taylor states that for one real rape tried in the courts there were, on the average, twelve pretended cases. Some of these cases of false accusation are founded on a mistake, as may happen with infants, children and persons mentally defective. In other cases the accusations are made willfully and designedly for the purpose of extortion or revenge, or from another ulterior motive. In some instances the false accusation may be at once disproved by medical evidence, though it has happened that the medical man has been deceived and duped by designing persons. In many cases in adults the medical evidence is not decisive, and the truth or falsity of the charge must rest almost wholly on the statement of the prosecutrix herself along with the corroborating circumstances.

The question for the physician to decide as far as possible, from his examination, is whether or not sexual intercourse took place, or was attempted, at approximately the time indicated. Subsidiary information may be required; e.g., as to whether there were evidences of violence elsewhere on the body, or as to whether intercourse has ever taken place or has frequently taken place, or as to whether death was caused by the injuries inflicted, or as to whether disease was communicated at the time, and if so, what is the nature and probable outcome of such disease. On all such points the physician is supposed to be informed, and he is also supposed to keep such record of his cases as will enable him to testify with certainty, some years afterward, concerning his findings in any particular case.

For the consideration of the medical evidence of rape it is convenient to divide the cases into three classes, the first including infants and children, the second including young unmarried women and the third including married women.

There are, however, certain points that should be kept in mind in all cases. When called to examine or treat a person on whom rape is alleged to have been committed, notice and record, as soon as you can conveniently, the following points, for you are likely to be questioned in court concerning them.

1. The precise time at which you were summoned, the exact hour and date of the examination and the place of the examination. It is important in some cases to know whether or not the female, alleged assaulted, took the earliest opportunity to complain. Also, the exact time elapsing between the alleged assault and the examination has an important bearing on the signs found. The place of the examination at a certain time may be important as showing the truth or falsity of some statement of the defense or prosecution regarding the movements of the female shortly after the time of the alleged assault.

2. Marks of violence about the genitals.

3. Marks of violence on the body elsewhere or on the clothing of the complainant.

4. Presence of stains of spermatic fluid or of blood on the clothing. When the character of the stain is not clear, make a microscopic examination of the contaminating material.

5. The existence of disease probably conveyed in the alleged assault (gonorrhea, syphilis, chancroid).

The evidences of rape will vary with the age of the patient and other circumstances.

It may be stated that, to establish the fact of rape, it is not necessary to prove penetration into the vagina by the male organ. It has been decided that, if the evidence shows penetration of the vulva or to the vulvar cleft, that is sufficient—the legal establishment of the crime requiring only the fact of the penetration, the degree of penetration being quite immaterial. Consequently, the hymen is not necessarily ruptured, even in cases where entrance of the male organ into the vagina would be absolutely impossible without such rupture. "Medical men sometimes have fallen into error on this point, considering that, when the hymen was entire, rape could not have been committed, but the statute law says nothing about the rupture of the hymen as a necessary part of the medical evidence; it requires from the medical witness merely proof of vulvar penetration—this may occur and the hymen remain intact."* However, laws differ, and in any case it would be well to look up the wording and interpretation of the law in the state or country where the alleged assault occurred.

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*Taylor's Medical Jurisprudence: American Edition by Clark Bell.

Infants and Children

In the case of infants and children there are usually decided evidences of injury about the genital organs. Of course, such injury does not necessarily exist, but when it does not exist the proof of rape must rest largely on evidence other than medical. Again, where there are evidences of injury about the genitals in a child alleged to have been assaulted, it does not necessarily follow that the injuries are due to rape. The abnormal appearance may be due to some disease or to some accidental injury, or to some injury inflicted by a designing person with the object of deceiving the physician. All these things must be kept in mind. In this, as in other situations, the physician's diagnosis of the conditions present and the interpretation of the meaning of those conditions must be founded on incontrovertible physical evidence that will stand attack from all sides.

The evidence of rape will, of course, vary much with the time that elapses after the occurrence before the child is seen.

1. If the child is **seen within a few hours**, the following conditions may be present:

a. More or less abrasion of the vulva and vaginal opening, with probably some bleeding or clots. If penetration into the vagina has taken place, there may be extensive injuries—tearing of the hymen, perineum, and vaginal walls into the rectum or even into the peritoneal cavity (Figs. 350 to 352).

b. Evidences of violence elsewhere on the body or about the clothing—scratches or bruises on the body, tears of clothing, or blood on same or disarrangement of same. In some cases the child has been rendered insensible by a blow on the head or by some drug administered.

c. Presence of semen in the vicinity of the genitals of the child or on the clothing. The contaminating material should be submitted to microscopic examination, that the presence or absence of spermatozoa (as a positive evidence of semen) may be determined.

d. Presence of gonorrheal pus on the genitals. The presence of pus about the genitals of the child does not necessarily indicate rape. The pus may have been put there, with blood and scratches, for purposes of deception. If microscopic examination of the pus shows gonococci, it has come, directly or indirectly, from gonorrheal inflammation in a male or female. Gonorrheal ophthalmia is a not infrequent form of gonorrheal inflammation, and the pus from such a condition in the mother or attendant may be responsible for the gonorrheal vulvitis in the child.

2. If the child is **seen after a few days** or a week or so, the following conditions may be found:

a. Acute inflammation, apparently due to violence. The fact that inflammation is present is established by the presence of a mucopurulent discharge, yellowish in color and staining the linen. This may not be present the first day or two, but after that it is ordinarily present if there has been much injury of the vulva or vagina. The inflammation is further indicated by the redness of the parts, the tenderness and the pain on urination.

The acuteness or recent onset of the inflammation is shown by the severity of the process compared with its extent, the marked painfulness of the affected areas, the presence of recent abrasions and tears about the hymen and vulva, and possibly swelling from edema. The parts may be so painful that the child strongly resists any attempt to make an examination—even the separation of the thighs. This is of no diagnostic significance, as children with inflammation from other causes, or even with no inflammation, may do the same. If this obstacle to examination is extreme, it may be necessary to anesthetize the child in order to make the examination. If extensive inflammation is present, there may be fever, and in the very extreme injuries the most serious acute symptoms may develop. Several deaths from this cause, with consequent convictions for murder, have been recorded.

The fact that the inflammation was immediately preceded by violence or mechanical injury is shown by the evidences of recent tears or abrasions, or by ecchymoses due to bruises from some cause, and also by the extent and severity of the inflammation in such a short time and without other apparent cause. Gangrene with sloughing of the external genitals and vagina and adjacent tissues has occurred from these causes, usually with fatal effect, though some have recovered after considerable sloughing.

Care should be taken to exclude similarly appearing conditions due to other causes. The very severe inflammation of the genitals called "noma" has more than once led to a mistaken supposition of rape. It is seen principally in debilitated children with severe acute diseases, such as scarlet fever, diphtheria, typhoid fever, etc. Occasionally, however, it occurs in apparently healthy children where the genitals are neglected and dirty, permitting some severe infection. It may follow marked bruising or injuries of the parts from any cause. It may follow even a comparatively slight injury in an otherwise healthy child. Taylor relates a rapidly fatal case in a child five years old who accidentally fell on some thorns, from which she sustained slight injuries, followed by a severe infection and noma and death. The condition of the parts, with the evidence of mechanical injury, were such that it might easily have led to a charge of rape, had the real cause not been known.

b. Gonorrheal inflammation in the acute state. Gonorrheal inflammation is likely to extend into the urethra, though the vagina may escape. The diagnosis of gonorrheal inflammation is established by finding gonococci in the discharge. The significance of the presence of acute gonorrheal inflammation depends on circumstances as already explained.

c. Evidences of chancroidal infection (page 262).

d. There may be present some of the other conditions mentioned under the earlier examination.

The disturbance of the parts may be very slight, as shown in cases where other circumstances proved the rape. For example, an adult was convicted of rape on an infant only seven months old. According to the medical evidence the vulva was somewhat swollen, there was slight excoriation about the labia minora and a small amount of blood. The hymen was not lacerated, and there was no evidence of penetration past it. Seminal fluid was found on the person of the child.

The evidences of rape, when not severe, may very quickly disappear. Casper relates a case of a girl of eight years upon whom rape was committed by a man in a drunken condition. The girl was examined the next day. The labia were then reddened, and there was congestion about the vaginal entrance, which was very tender. Examination ten days later showed the genitals to be in their natural state, and there was nothing at that time to indicate that the girl had been subjected to violence.

3. An examination **after some weeks or months** may show no evidence of the disturbance, or may show one or more of the following conditions:

a. Chronic mucopurulent discharge from the vulva or vagina. This is present in many infants and young girls from simple causes, such as want of cleanliness, scalding from frequent irritating bowel movements, seat worms, irritating urine, adherent prepuce over clitoris, skin diseases of the vulva, pediculi and various other sources of irritation about the genitals.

b. Chronic gonorrheal discharge from the external genitals or vagina. The fact that the discharge is gonorrheal is established by finding gonococci. If the beginning of this discharge can be fixed as about the time of the alleged assault, it is strong corroborative proof. Gonorrheal vulvitis and vaginitis occur, however, not infrequently from wholly different causes, as previously stated.

c. Evidences of syphilis or chancroid.

d. Laceration or destruction of hymen. The presence of the intact hymen does not preclude rape, as previously explained, neither does the absence of the hymen or apparent laceration of the hymen necessarily imply injury of the membrane by rape or otherwise, though the condition of the hymen might be strong corroborative proof in a particular case, especially if it could be established by the mother or the nurse, or a physician who had made an inspection, that there was, prior to the time of the alleged assault, a well-formed and apparently intact hymen. The hymen is very different in shape and appearance in different individuals. Occasionally it is practically absent in a child otherwise normal.

e. Abnormal size of vagina, as though it **had** been at one time dilated. Permanent marked dilatation is not very likely to follow a single distention by coitus or otherwise. This condition, which is found occasionally in older girls where the question arises, is due usually to repeated distention of the vagina, by coitus or otherwise, extending over a considerable period of time. In such cases, the parts may soften and relax to a remarkable extent, even leading to the suspicion that childbirth may have taken place.

f. Scars from injury of the genitals. The genitals are exceptionally well protected, and are not often injured, except by some disease process or in attempts at coitus. Occasionally a child will fall astride of some object and inflict an injury. Again, injury may come from attempts of the child to introduce some foreign body into the vagina, though such injuries are more likely to be found in girls somewhat older. Scars about the genitals may, of course, result from any severe inflammation or destructive process, and also from chronic inflammation of milder grade when it is accompanied by persistent scratching, with resulting ulceration.

Older Girls and Unmarried Women

In this class, the severity and certainty of the signs decrease and the difficulties of arriving at a definite conclusion increase. The mechanical injuries following coitus, or attempted coitus, are less marked and sooner disappear, and there remain fewer deviations from the normal. Again, in the case of older girls and adult women the medical man is likely to be subjected to two lines of questioning—(A) as to whether or not coitus or attempted coitus took place at about the time of the alleged assault, and (B) whether or not coitus has ever taken place before, and, if so, whether several times or over a considerable period.

A. **Evidences of Recent Coitus or Attempted Coitus.**—The evidences found will, of course, depend to a considerable extent on the period of time which intervenes between the assault and the examination. If the examination is made within a few hours after the assault, one or more of the conditions previously mentioned may be found. The mechanical injury to the genitals is likely to be less because the parts are larger, and the epidermis less delicate and less easily abraded. The evidences of injury on other parts of the body are likely to be more marked because of the greater resistance which the victim is able to make.

If the examination is made after a few days or a week, the additional points already mentioned must be investigated. As the local injuries are less than in younger females, they will subside more quickly.

If the examination is made after several weeks or months, the problem for the physician resolves itself into determining whether or not sexual intercourse has ever taken place. The determination of the time when the coitus took place is ordinarily impossible after several weeks have elapsed. In certain cases the medical testimony may be strongly corroborative of other testimony in establishing the time of the assault, even after several months. For example, if it should be established by other testimony (a) that up to the time of the assault the young woman was perfectly well and had never had coitus, and (b) that immediately afterward she had a discharge and had been sick more or less ever since, and (c) that there had been no subsequent coitus—then the finding of a chronic pyosalpinx with chronic endometritis, in an examination some months later, would be strong corroborative proof that the infecting coitus took place about the time of the alleged assault.

Ordinarily, however, after a few weeks all the acute and subacute evidences have subsided, leaving only those that, so far as any distinctive characteristics are concerned, might have been there some months or some years. So the question here is essentially whether or not coitus has ever taken place in the case of the individual concerned.

B. **Evidences of Remote Coitus.**—Ordinarily, it is easy to tell, by a comparatively superficial examination, whether or not a girl or woman has probably had coitus. The differences in appearance of the external genitals and vagina when coitus has taken place (especially if it has taken place several times) are usually so marked that the physician has little difficulty in distinguishing them. This is the general rule. There are, however, exceptional cases which present many of the ordinary evidences of coitus when in fact none has taken place. On the other hand, there are persons who present signs which are considered almost pathognomonic of virginity when in fact sexual intercourse has occurred, and not only sexual intercourse, but pregnancy and labor at full term. So, in exceptional cases it may be very difficult to decide certainly whether or not sexual intercourse has occurred, and in such a case it is particularly difficult to legally prove the same, for the anomalies must then be considered.

The Evidences of Remote Coitus or attempted coitus can be summed up as follows:

1. Evidences of **previous childbirth** at or near term.

a. Destruction of the hymen, leaving only irregular tags here and there about the vaginal opening, with scar-tissue between. This condition is very strong evidence of childbirth at or near term. It means that there has passed through the vaginal opening some body large enough not only to stretch and lacerate the hymen, but to stretch out the vaginal ring enormously, and to so stretch and compress and bruise the hymen that the subsequent sloughing and scar-contraction has practically destroyed it. There is really no hymen that can be traced as a circular ring of tissue with simply laceration from intercourse. The hymen, as such, is gone, and there remain only irregular projecting particles of tissue (carunculae myrtiformes) here and there to mark the place where the hymen used to be. Of course a large tumor, e.g., a myoma—delivered through the vagina might do the same. Also, some destructive inflammatory process or serious injury during childhood or later might produce practically the same result, but such conditions are rare and show also other evidences. There are cases of congenital deformity in which the hymen may be present simply as irregular tags of tissue, or it may, as recorded in some cases, be absent altogether. In such cases, we would not expect the scar-tissue about the vaginal opening or the marked enlargement of the opening. So the destruction of the hymen as described, when present, is strong presumptive evidence of previous childbirth.

Suppose the hymen is not destroyed—does that prove that no childbirth has taken place? Not necessarily. Occasionally during the labor the hymen is simply torn and then the ring beyond it is stretched and torn. After labor, the portions may heal in such a way that the hymen appears practically intact. Still rarer cases have been recorded in which the hymen softened and dilated sufficiently to permit the child to pass and then underwent involution to about its former size. Such a hymen is likely to stretch also during coitus instead of tearing. The examination of such a patient would show an "intact hymen," or, as some, laying too much stress on the condition of the hymen, are wont to write, "virgo intacta." The absurdity of such a designation based only on the condition of the hymen is well expressed by Taylor when he remarks, "Such 'virgines intactae' have frequently required the assistance of accoucheurs and have in due time been delivered of children."

b. Evidences of laceration of great stretching of the perineum, vagina and pelvic floor. These evidences are a large vaginal opening, close approach of the opening to the anus (partial destruction of perineal body), scars about the opening or on the perineum, lax vaginal walls and lax pelvic floor. These have about the same significance as the destruction of the hymen above mentioned—that is, their presence is strong evidence of previous childbirth, but their absence is not of much legal significance.

c. Laceration of the cervix. The establishment of a distinct laceration of the cervix is very strong evidence of a previous parturition or operation involving division of the cervical wall. There are conditions that simulate a slight laceration, but a deep laceration would hardly be simulated by anything short of some congenital deformity, and in such a case there would be likely to be other deformities. Also, there would be no scar-tissue, such as is ordinarily found about a laceration of the cervix.

d. Evidences of previous lactation. It may be possible to press some fluid from the breasts, or the breasts may show the enlarged veins and the white striae (lineae albicantes) of a previous distention.

e. Evidences of a previous distention of the abdominal wall. There may be present the striae (lineae albicantes) indicative of previous stretching of the skin from distention from pregnancy or other causes. When other causes (obesity, tumor, ascites) can be eliminated by the history, such striae indicate previous pregnancy. Also, marked relaxation of the abdominal wall may be due to previous distention by pregnancy.

2. Evidences of **previous abortion.** The evidences are exceedingly uncertain in many cases after a short time. There may be some slight lacerations, with resulting scars, that may be corroborative evidence, especially partial laceration of cervix. Their presence may help some, but their absence is of no particular significance.

3. **Laceration of Hymen** and some dilatation and laxity of vaginal opening and vaginal canal. These are the ordinary evidences of coitus and are nearly always present, especially if repeated coitus has taken place. Usually the opening in a virgin hymen is so small that the introduction of one finger is effected with some difficulty and causes pain. Ordinarily, after repeated coitus has taken place, the vaginal opening admits two fingers easily for examination, and without pain, provided the perineal edge of the opening is carefully depressed.

In exceptional cases the hymen may remain intact after coitus, particularly in those cases where the opening is large and a little stretching will accommodate the male organ. Occasionally, however, a hymen with a small opening will remain intact. In such cases the hymen is usually elastic and unusually tough, and consequently it stretches and dilates under a force that would rupture an ordinary hymen. So that, though it may be said that there are many exceptions to the rule that "coitus ruptures the hymen," there are very few cases in which a hymen presenting the normal rupture capacity (or normal size, normally tense and having the normal consistency, elasticity, and strength) does not rupture on first coitus. In doubtful cases, then, the physician should take care to ascertain accurately, not only the presence of the hymen, but also its character.

The apparent laceration of the hymen or even the absence of the hymen, while presumptive evidence of coitus, is not positive evidence of the same. It may be absent wholly or partially from congenital deformity. It may have been destroyed or dilated by disease or injury in infancy, childhood or later life. It may have been lacerated by an operation or an examination. Its apparent laceration is, however, strong, corroborative evidence of coitus when taken in connection with the history of the case, and especially when there is reliable testimony establishing that it was formerly intact.

4. Evidences of a **disease** usually communicated in sexual intercourse, such as gonorrhea, syphilis, chancroid, pediculosis pubis.

5. Evidences of uterine or tubal **inflammation,** presumably due to infection following labor or abortion, or coitus.

Married Women

In married women normal sexual intercourse has, of course, already taken place, so that the establishment of the fact of coitus is of no help in establishing rape. The medical evidence, if any is required, must bear upon the question of coitus by some one other than the patient's husband and against her resistance.

The following points should be investigated:

1. Evidences of **injury about the genitals,** indicative of forced and hurried coitus. There may be abrasions, tears, bruises or bleeding.

2. Evidences, elsewhere on the body or clothing, of **injury in resistance.** There may be bruises and scratches, or an excited or hysterical state, such as might be caused by a harrowing experience. The clothing may show tears or bloodstains, or contamination with dirt of the road or disarrangement. Of course none of these evidences of violence establish the crime of rape. They only go to show that something was attempted that excited the woman's resistance. They might have been due to attempted robbery or to a quarrel. Again, they may have been placed there intentionally. The woman may be trying to deceive for the purpose of extorting money or for other reasons.

3. Stains of **spermatic fluid** may be present on the clothing or person of the woman. If there is any suspicious stain, some of the contaminating material should be submitted to microscopic examination, that the presence or absence of spermatozoa may be determined. Any discharge in the vagina may also be examined microscopically, but the presence of spermatozoa in the vaginal discharge is not of much significance unless it can be established that no coitus with the husband has taken place for three or four days.

4. **Disease** (gonorrhea, syphilis, chancroid) not present in the husband.

The Question of Consent

The question of consent is often the crucial point on the legal side of these cases of alleged rape in adult women, whether married or unmarried. This question is, as a rule, decided largely or wholly by testimony other than medical. In some cases, however, the medical man may be required to give testimony concerning corroborative facts. An adult woman of ordinary health and strength is supposed to make strong resistance. In such a case, if there are no obvious evidences of resistance, the legal assumption is that consent was given and the case is not one of rape. It has been claimed that a strong woman can make effective resistance, and therefore that an accusation of rape by such a woman is an absurdity. "Some medical jurists have argued that a rape cannot be perpetrated on an adult woman of good health and vigor, and they have treated all accusations made under these circumstances as false." This view is too extreme, for there are circumstances and conditions that would make effective resistance impossible even by a woman of unusual strength, as when two or more are combined in the attack or when the woman is rendered powerless by terror or by exhaustion from long struggling with her assailant. The physician may be required to state his opinion regarding the possibility or probability that sexual intercourse could take place without the consent of the woman under various circumstances; for example, the following:

1. When a woman is weak from age, sickness or other bodily infirmity. That coitus could be forced under such circumstances is evident.

2. Where there is imbecility or other form of mental irresponsibility. In such a case consent in the legal sense is impossible.

3. When the woman is attacked by several persons or by one person of superior strength. Rape is unquestionably possible under such circumstances.

4. Where there is unconsciousness or partial unconsciousness from narcotics or intoxicating liquors. Coitus may take place under such circumstances without the consent, and in some cases even without the knowledge of the woman. Many young women are ruined in this way in the "wine-rooms" of our cities. This fact is recognized in the law which makes it a crime to give a woman intoxicants with the intention of stupefying her, so that coitus may take place without her consent.

5. When there is unconsciousness or partial unconsciousness from a general anesthetic, such as chloroform or ether or laughing gas. The fact that rape may, and occasionally has been, committed under these circumstances is sometimes taken advantage of by designing persons to extort blackmail from dentists and others who must, in their work, anesthetize or partially anesthetize patients without a third party present.

Anesthesia or partial anesthesia of a girl or woman without a third party present is hazardous for another reason. The patient, while going under the anesthetic or recovering from the same, may experience certain feelings or hallucinations that cause her to really believe and firmly proclaim that sexual intercourse took place. Many such cases of false accusations, honestly made, are on record. In one instance "a young lady was accompanied to a dentist by her affianced lover, who never left her while the anesthetic was administered and a tooth extracted; yet she could scarcely be convinced subsequently that the dentist had not attempted to ravish her."

6. When there is unconsciousness or partial unconsciousness from hypnotic sleep. Convictions have occurred of undoubted rape under this condition. Also, false accusations may be honestly made from sensations experienced in this condition. This comes under partial or complete anesthesia. Another source of false accusations, honestly made, is mental aberration of various kinds—from well-marked insanity to the various functional nervous disturbances.

7. When there is unconsciousness or partial unconsciousness from fainting, syncope, an epileptic seizure, a fall or a blow.

8. When the woman is temporarily helpless from terror or from an overpowering feeling of horror at her situation.

9. A woman may cease her resistance under threats of death or duress.

FOREIGN BODIES LEFT IN ABDOMEN

This is a subject the importance of which is frequently not appreciated by the physician until he is involved in a lawsuit concerning it. To make absolutely certain that no sponge or other foreign body is left in the peritoneal cavity at operation is a hard problem. The solution of this problem is considered in Chapter XVII, under "Preparation of Instruments and Dressings."

OTHER CONDITIONS

Presenting Medico-Legal Points

1. The various medico-legal questions concerned with the state of pregnancy, abortion, labor and the puerperium belong more strictly to obstetrics, and need not be considered here.

2. The question of the character of a disease present—particularly gonorrhea, syphilis, or chancroid—and the source from which it could have come, and whether or not it is still transmissible, are all questions that may assume medico-legal importance under various circumstances; for example, in suits for divorce, suits for possession of children, suits for alimony, suits for damages against individuals or corporations, etc. Also, of injuries of the genital organs you may be called to give the nature, extent, possible cause and probable outcome. All these are simple clinical questions, and the information regarding them may be obtained from the clinical portions of this work.

3. Various questions in regard to sterility may come up in legal inquiries. The required information on this subject is given in Chapter XIV.

4. In the case of the death of a woman or girl under suspicious circumstances, the physician may be called upon to make a postmortem examination and then to answer, as far as possible, various questions, among which may be the following:

What pelvic lesions were present?
What was the probable cause of these lesions?
What was the cause of death?

5. In coroner's cases, and much more so in malpractice suits (before or after death), the following questions may be asked concerning almost any gynecologic disease:

What disease is present?
What are the principal points upon which your diagnosis is based?
In your opinion did the attending physician use reasonable care and skill in the diagnosis?
What is the established treatment for the disease?
In your opinion did the attending physician use reasonable care and skill in the treatment?

6. In criminal cases and in damage suits the physician testifying as an expert may be required, particularly in the cross-examination, to explain in detail various points in the etiology, pathology, symptomatology, diagnosis, treatment and prognosis of the affection under consideration. To answer such questions, the physician must be well grounded in all the important facts and theories of the disease, and must be able to give the required explanations in a few words and in ordinary language, avoiding the little-understood technical terms.

On important contested points it is well to be fortified with the names of two or three recognized authorities on that particular subject, with their exact statements. This information is, of course, held in reserve, to be given only if requested.

INDEX

DIAGNOSTIC, THERAPEUTIC AND GENERAL INDEX

Note.—Under "Examination, gynecologic," (page 984), the references are arranged systematically as in the text, instead of alphabetically. Following this, under "Examination" (page 985), the references are arranged alphabetically.

A

- Abdomen, 12, 133
  - auscultation of, 29
  - contour of, 13, 133
  - discoloration of, 12, 144
  - disinfection of, 925
  - distention of, 136
  - dullness in, 27, 152
    - from ascites, 152
    - from bladder, 152
    - from kidney tumor, 156
    - from liver, 153
    - from ovarian tumor, 154
    - from perirenal tumor, 157
    - from retroperitoneal tumor, 156
    - from spleen, 153
    - from tubal mass, 154
    - from uterine myoma, 154
  - examination of, 12, 133
  - exploration of, 624
  - fetal heart sounds, 29
  - fetal movement, 27
  - fluid wave, 25
  - friction rub, 27
  - foreign bodies in, 937, 971
  - in ascites, 138, 153
  - in gynecologic diagnosis, 133 (*See* Diagnosis)
  - in obesity, 133
  - in pregnancy, 140
  - in tumors, 135
  - in tympanites, 137
  - inspection of, 13
  - mass in, 14, 23, 150
    - in central lower, 151, 178, 180
    - in left lower, 151, 178, 186
    - in right lower, 150, 173, 181
    - in central upper, 152
    - in left upper, 151
    - in right upper, 151
  - mensuration of, 30
  - movements of, 143
  - palpation of, 14, 150
  - percussion of, 27
  - point tenderness, 21
  - prominence of, 14, 133
  - regions of, 15
  - shape of, 13, 133
    - in ascites, 138
  - sterilization of, 925
  - tenderness in, 14, 145
  - tension of, 14, 144
  - tumor of, 143
  - vascular murmur, 29
- Abdominal adhesions, 681
  - antisepsis, 925
  - applications, 202 (*See* Applications)
  - bandage, 947
  - diagnosis, 134, 181, 190
  - drainage, 662, 950
  - dressing, 947
    - drainage cases, 950
    - ordinary cases, 947, 950
    - septic cases, 950
    - sterilization, 925
  - examination, 12, 133 (*See* Examination)
  - gynecologic examination, 12, 133 (*See* Examination)
  - hernia, 135
  - hysterectomy, 594, 598
  - incision, 935 (*See* Incision)
    - closure of, 936
  - myomectomy, 594, 598
  - operation, 921
  - palpation, 14, 150
  - pregnancy, 728
  - section, 667, 921
    - after-care in, 944
    - after-treatment of, 944
      - bandage, 947
      - bladder, 945, 947
      - bowels, 945
      - by days, 944
      - constipation, 954
      - diet, 945, 947
      - dilatation of stomach, 953
      - drainage, 950
      - dressings, 947
      - drink, 945
      - exercise, 949
      - first day, 944
      - fistula, 957
      - fourth day, 946
      - Fowler posture, 672, 952
      - hemorrhage, 952
      - hernia, 957
      - internal hemorrhage, 952
      - intestinal obstruction, 955
      - intestinal paralysis, 954
      - kidney insufficiency, 954
      - laxatives, 946, 954
      - local suppuration, 955
      - nausea, 953
      - nervous disturbances, 958
      - orders, 946
      - pain, 945, 957
      - peritonitis, 955
      - phlebitis, 956

Abdominal section,—Cont'd
    position, 945, 952
    pulse, 952
    regular, 944
    removing sutures, 948
    restlessness, 945
    second day, 945
    sedatives, 945
    shock, 952
    sinus, 957
    sitting up, 949
    special conditions, 950
    stimulants, 952
    strapping, 947
    strychnia, 952
    subsequent orders, 947
    sutures, 948
    temperature, 955
    third day, 946
    thirst, 945
    tympany, 953
    uterine replacement cases, 952
    vomiting, 945, 953
    walking, 949
    wound, 948
  anesthesia in, 932
  bandage in, 936
  contraindications for, 922
  dangers in, 923
  drainage in, 950
  dressings after, 936, 950
  exploratory, 921, 935
  incision, 935
  indications for, 922
  position of arms during, 934
  preparations for, 923
    assistants, 932
    diet, 925
    disinfection, 925
    dressings, 926
    examination, 924
    face mask, 932
    general, 923
    gowns, 932
    hand disinfection, 933
    in home, 923
    instruments, 926
    kidneys, 924
    laxatives, 925
    nervous system, 924
    operative field, 925
    patient, 924
    rubber gloves, 932
    sleeves, 932
    sponges, 926
    sterilization, 925
    surface of abdomen, 925
    sutures, 932
    take to hospital, 923
  regular steps in, 934
    anesthesia, 934
    closure of incision, 936
    correction of pathologic condition, 935
    dressing, 936
    exploration, 936
    incision, 935
    toilet of peritoneum, 936
  rubber gloves in, 932

Abdominal section in,—Cont'd
    special points in, 936
      drainage, 936
      injuries, 937
      instruments left, 937
      shock, 937
      sponges left, 937
  sponges, 926
  supporter, 949
  surface, sterilization of, 925
  touch, 12
  wall, 12, 25, 133
    abscess, 135
    fat, 133
    inflammatory mass in, 135
    movement of, 143
    relaxation, 136
    separation of recti, 136
    skin, 12
    tumor, 133
  wound, 935
    infection of, 955
    strapping of, 947
    suppuration of, 955
    sutures in, 932, 948
Abdominorectal examination, 88
Abdominovaginal examination, 50
Abnormal pregnancy, 182, 718, 822
Abortion, criminal, 6, 971
  incomplete, 6
  induced, in myoma complicating pregnancy, 598
  metrorrhagia from, 6, 880
  tubal, 726
Abscess, 659, 677
  appendiceal, 182
  broad ligament, 176, 660, 687
  of abdominal wall, 135 (*See* Abdominal wall)
  of Bartholin's glands, 33, 165, 322
  of vulvovaginal gland, 33, 165, 322
  ovarian, 653, 680
  pelvic, 176, 186
    acute, 651
    after-treatment, 665
    appendiceal, 182
    bacteria, 699
    broad ligament, 176, 660, 687
    chronic, 676
    diagnosis, 656, 690
    diffuse, 653, 678
    drainage, 662
    drainage tubes, 663
    gonococcal, 699
    opening, 660
    ovarian, 653, 680
    prognosis, 674
    streptococcal, 699
    treatment, 658, 695
    tubal, 653, 680
    tuboovarian, 653, 680
  suburethral, 166, 318
  tubal, 653, 680
  urethral, 318
  vulvovaginal, 1, 165, 322
Absence of hymen, 967
  of uterus, 834
  of vagina, 163, 815, 818

Accessory Fallopian tubes, 719
  ovary, 816
Acetone, applications in carcinoma, 630
Acid, oxalic, 933
Action of pessaries, 512
Acute dilatation of stomach, 953
  endocervicitis, 432
  endometritis, 469
  metritis, 469
  pelvic inflammation, 651
    cellulitis, 654
    oophoritis, 652
    operation for, 652
    ovaritis, 652
    peritonitis, 653
    salpingitis, 652
    treatment, 658
  urethritis, 34, 251
  vaginitis, 279, 286
  vulvitis, 268
Adenocarcinoma of cervix uteri, 600
  of corpus uteri, 632
Adenoma, malignant, 633
Adenomyoma of uterus, 553, 560
Adherent labia minora, 163, 358
  prepuce, 163, 358
  retrodisplacement, 509, 523
Adhesions, 681
  abdominal, 681
  diagnosis of, by x-ray, 107
  of clitoris, 163
  of external genitals, 358
  of Fallopian tubes, 681
  of intestines, 681
  of labia, 163, 359
  of ovaries, 681
  of prepuce, 163, 358
  of uterus, 523
  of vaginal walls, 158, 286, 818
  tuberculous, 714, 717
Adhesive plaster, 947
  vaginitis, 286
Adjustable foot-rests, 131
  leg-holders, 131
Adrenal bodies, relation to gynecology, 894
Adult, endometrium of, 415
After-care in abdominal section, 944 (*See* Abdominal section)
After-treatment, 944
  for repair of cervix, 456
  for repair of pelvic floor, 389
  in abdominal section, 944 (*See* Abdominal section)
  in curettage, 481
  in operative cases, 944
  in pelvic abscess, 665 (*See* Abscess)
  in pelvic drainage, 672, 950
  in perineorrhaphy, 389
  in trachelorrhaphy, 456
  in vaginal section, 958
Agents, antiseptic, 122
Albicans, corpus, 752
Alexander-Adams operation, 528
Amenorrhea, 831
  causes of, 832
  classes of, 832
  diagnosis of, 831
  in the virgin, 832
Amenorrhea,—Cont'd
  symptoms of, 831
  treatment of, 834, 841
Ampullar pregnancy, 720
Amputation of Fallopian tubes, 940
  of cervix uteri, 462
  of corpus uteri, 943
  supravaginal, 594, 943
Amyloid degeneration of myoma, 560
Anal fissure, 45
Anatomy of Bartholin's glands, 34, 244
  of endometrium, 415
  of external genitals, 32, 157
  of Fallopian tubes, 644
  of hymen, 157, 246
  of ovary, 947
  of parovarium, 761
  of pelvic connective tissue, 650
  of pelvic floor, 360
  of pelvic peritoneum, 649
  of peritoneum, 426
  of round ligament, 426
  of urethra, 242
  of uterus, 409
  of vagina, 247
  of vulva, 157, 239
  of vulvovaginal gland, 34, 244
  pelvic, 1, 409, 499, 644
Anemia, and amenorrhea, 832
Anesthesia, 934
    ether in, 934
  for diagnosis, 112
  for examination, 112
  for operation, 934
  general, 112
  gynecologic examination under, 112
  in abdominal section, 934 (*See* Abdominal section)
  local, 72, 212
  paralysis from, 934
  position of arms in, 934
  preparation for, 923
  scopolamin in, 740
Ani muscle, levator, 364
  sphincter, 372
Animal extracts, 234, 905
Anodynes, 72
Anomalies, 815
  due to disturbed endocrine gland function, 896
  of bladder, 140, 816
  of Fallopian tubes, 719, 816
  of hymen, 163, 817
  of ovaries, 816
  of urethra, 815
  of uterus, 820
  of vagina, 163, 818
  of vulva, 816
Anus, 45
Anteflexion, of cervix, congenital, 170, 550
  operation for, 860
Anterior colporrhaphy, 392
  vaginal section, 938
Antero-posterior section of pelvis, 2, 3
Anteversion, 550
Antisepsis, abdominal, 925
  in examinations, 122
  vaginal, 478

Antiseptic agents, 122
  douche, 206
  preparation for examination, 122
Antitoxin, 234
Aphthae of vagina, 285
Appendiceal abscess, 182
Appendicitis, 145, 657
Appendix, diseases of, 182
  vermiform, 182
Applications, 202
  abdominal, 202
  cervical, 208
  cold, 204
  counterirritant, 205
  dry heat, 203
  for endometritis, 472, 476
  hot, 202
  intrauterine, 218
  moist heat, 202
  vaginal, 206
    concentrated solutions, 210
    douches, 206
    powders, 213
    suppositories, 214
    tablets, 214
    tampon-capsules, 217
    tampons, 214
  vulvar, 206, 211
Apron, Hottentot, 335
Arms, position of during abdominal section, 934 (*See* Abdominal section)
  position of, in anesthesia, 934
Arrangements, office, 121
Artery forceps, 377
Ascites, 138
  abdomen in, 138, 153
  diagnosis of, 138, 152
  dulness in, 27, 152
  percussion of abdomen in, 152
  shape of abdomen in, 138
  signs of, 153
  wave in, 26
Asepsis in intrauterine examination, 122
  in operations, 925
    abdominal, 925
    vaginal, 940
  in vaginal examination, 122
Aseptic fever, 956
Assault, indecent, 961
Assistant in office, 121
  in operations, 932
Astringents, 206, 211
Atresia congenital, of cervix, 173
  congenital, of vagina, 163
  of cervix, 173
  of hymen, 163
  of uterus, 173
  of vagina, 163, 815, 818
Atrophy of uterus, 853, 898
Auscultation, 29
  in pregnancy, 29
  of abdomen, 29

B

Bacillus, Ducrey, 291
Backache in gynecologic diagnosis, 195 (*See* Diagnosis)
Backache, localization of, 31
Bacteria, 255, 469
  in cellulitis, 705
  in endometritis, 469
  in pelvic abscess, 652, 699 (*See* Abscess)
  in peritonitis, 652
  in puerperal abscess, 699
  in pyemia 699
  in pyosalpinx, 699
  in salpingitis, 699
  in uterus, 469
  in vagina 255, 279
  in vaginitis, 279
Bacterial treatment, 234
Bacteriologic examination, for gonococci, 255
    securing discharge for, 33
Bag, hot-water, 203
  ice, 204
Baking in carcinoma, 630
Bandage, 947, 959
  abdominal, 947
  in abdominal section, 947 (*See* Abdominal section)
  T, 959
Barrett operation for dysmenorrhea, 862
Bartholin's glands, 33, 244
  abscess of, 165, 322
  anatomy of, 33, 244
  examination of, 33
  palpation of, 35
Bathing in gynecologic treatment, 227
Bed, examination in, 126
Bed-pan, 207
Bicornuate uterus, 820
Bimanual examination, 50, 172
  gynecologic 50
  of uterus, 52
  palpation, 52, 172
  replacement, 510
  under anesthesia, 112
Bivalve speculum, 73
Bladder, anomalies of, 140, 816
  care of 390, 947, 960
  catherization of, 960
  distended, 140, 152
  drainage of, 408
  examination, 41
  injuries of, 937
  malformation of, 140, 816
  prolapse of, 163. 372, 393, 549
  rupture of, 140
Bleeding in menopause, 830
  senile, 830
Blood, 110
  examination of, 110
  retention of, 163
  supply of vulva, 247
  transfusion, 674
  vessels of external genitals, 247
    of ovary, 423, 752
    of pelvic floor, 361
    of tubes, 648
    of uterus, 414
    of vagina, 250
    of vulva, 247
Bloody discharge, 35, 160, 879
  causes of, 879
  treatment of, 880
Body, Wolffian, 761, 812

Bowels after operation, 390
  before operation, 925
  obstruction of, 955
  in pelvic affections, 658, 925
Broad ligament, 426
    abscess, 176, 660, 687
    cyst of, 177, 805
    hematoma of, 176
    thrombosis, 656
    tumor of, 184
    varicose veins of, 745
Brushes, 125
  hand, 125
  in examination, 125
Bubo, 293
Buried sutures, 384

C

Cachexia, 622
Caesarean section, 598
Calcareous degeneration of fetus, 187
Calcification, 560
Calculi of ureters, 176
  of veins, 745
Calculus, ureteral, 176
Canal of cervix, 410, 600
  of Gartner, 814
  of Nuck, 343
Cancer cases, classification of, 600
  curetment in, 630
  of cervix uteri, 600
  of corpus uteri, 632
  of ovary, 803
  of uterus, 600
  of uterus, operation for, 623
  of uterus, radical treatment for, 623
  x-ray in, 236, 628
Cantharides collodion, 205
  plaster, 205
Capillary drainage, 950
Carbon dioxide gas for insufflation, 103
Carcinoma, cervical, 600
  complicating pregnancy, 632
  of cervix uteri, 600
    diagnosis, 615
    duration, 614
    etiology, 600
    extension, 609
    hemorrhage, 622
    metastases, 616
    operability, 623
    operation, 624
    palliative treatment, 630
    pathology, 600
    pregnancy, effect of, 614, 632
    radium, 627
    symptoms, 615
    treatment, 623
    varieties, 601
    x-ray treatment, 628
  of clitoris, 311
  of corpus uteri, 632
    diagnosis, 633
    symptoms, 633
    treatment, 633
  of endometrium, 632
  of Fallopian tube, 744
  of ovary, 803
Carcinoma,—Cont'd
  of rectum, 610
  of urethra, 313
  of uterus, 600
  of vagina, 314
  of vulva, 310
  of vulvovaginal gland, 327
Cards, history, 9
Care of bladder, 390, 947, 960
  of pessaries, 518
Caruncle of external genitals, 321
  urethral, 321
    diagnosis of, 321
    treatment of, 322
Case record, 9
Catarrh, cervical, 434
Catarrhal vaginitis, 279
Catgut sutures, 384
Catheterization, 947, 960
Catheters, sterilization of, 960
Causes of amenorrhea, 832
  of bloody discharge, 879
  of carcinoma of cervix, 600
  of cystocele, 393
  of dysmenorrhea, 849, 863
  of endocervicitis, 434
  of endometritis, 469, 473
  of eversion of cervical mucosa, 435
  of extrauterine pregnancy, 718
  of gonorrhea, 251
  of kraurosis vulvae, 350
  of leucorrhea, 157, 875
  of menorrhagia, 843
  of metrorrhagia, 879
  of myoma, 553
  of papillary cysts, 772
  of peritonitis, 652
  of pruritus vulvae, 354
  of retrodisplacement, 501
  of salpingitis, 652, 677
  of shock, 937
  of sterility, 870
  of tubal pregnancy, 718
  of vaginitis, 251, 279
  of vulvitis, 268, 273
Cauterizing solutions, 212
Cautery, 218
Cecum, diseases of, 182
Celiotomy, 529, 921
Cellulitis, bacteria in, 705
  pelvic, 654, 687
  vulvar, 273
Cervical applications, 208
  canal, mass in, 171
  carcinoma, 600
  catarrh, 434
  cyst, 457
  dilatation, 223
  erosion, 438
  incision, closure of, 454
  laceration, 443
  mucosa, epithelium of, 431
    eversion of, 435
  myoma, 559
  polypi, 436, 463
    hemorrhage in, 463
  secretion, fixation test, 111
  ulcer, 441

Cervix uteri, adenocarcinoma of, 600
  amputation of, 462
  anatomy of, 420
  anteflexion of, 550
  atresia of, 173
  canal of, 410, 600
  cancer of, 600
  carcinoma of, 600 (*See* Carcinoma)
  classification of diseases, 430
  conditions of, 189
  congenital atresia of, 173
  cystic degeneration of, 434, 457
  dilatation of, 87, 478
  elongation of, 166, 460
  Emmet's operation for lacerated, 451
  endocervicitis, 432, 434
  epithelioma of, 600
  erosion of, 438
  eversion of, 443
  examination of, 46, 189
  exposing the, 77
  follicular degeneration of, 440
  glands of, 416
  hypertrophy of, 460, 540
  in gynecologic diagnosis, 170, 189 (*See* Diagnosis)
  infection of, 432
  injuries of, 443
  lacerations of, 159, 443 (*See* Lacerations)
  malformation of, 173
  malignant disease of, 600
  myomata, 559
  nodule in, 170
  occlusion of, 173
  operations, denudation in, 454
    for anteflexion, 860
    technic of, 451, 462 (*See* Technic)
  polypi of, 159, 436, 463
  repair of, incision for, 451 (*See* Incision)
    instruments for, 453
  Schroeder's operation on, 458
  sutures in, 454
  trachelorrhaphy, 451
  ulcer of, 159, 441, 618
Chafing, 276
Chancre, 291
  soft, 291
Chancroid, 291
  of external genitals, 291
  of vagina, 291
  of vulva, 291
  phagedenic, 291
Chancroidal adenitis, 295
  sinus, 297
Chancroidal virus, 291
Change of life, 830
Chemical nature of internal secretion, 884
Children, gonorrhea in, 266
  leucorrhea in, 281
  rape of, 963
  vaginitis in, 281
Chocolate cysts, 570, 784
Chorioepithelioma, 314, 633
Chronic endocervicitis, 434
  endometritis, 472
  gonorrhea, 257
  metritis, 488
  pelvic inflammation, 676
Chronic pelvic inflammation,—Cont'd
    bacteriology of, 699
    cellulitis, 687
    oophoritis, 689
    ovaritis, 689
    peritonitis, 666
    salpingitis, 677
    treatment of, 697
  urethritis, 318
  vaginitis, 263, 281
  vulvitis, 268, 271
Circulatory system in relation to gynecol 912
Cirrhosis of ovary, 689
  of uterus, 839
Classes of amenorrhea, 832
Classification of cancer cases, 600
  of causes of displacement, 501
  of diseases, 251, 430
  of examination methods, 11
  of fibroid cases, 553
  of fibromyoma, 553
  of fistulae, 395
  of operations for displacement, 528
  of retrodisplacement cases, 528
  of therapeutic measures, 199
  of tumors of ovary, 762
  of vulvar diseases, 251
Cleansing soap, 124
Climacteric, 830
Clitoris, 243
  adhesions of, 163
  carcinoma of, 310
  cyst of, 339
  hypertrophy of, 338
  malformation of, 338
Closure of abdominal incision, 936
  of cervical incision, 454
  of perineal incision, 389
Cocaine, 212
Coccygodynia, 194, 197
Coccyx, examination of, 90
  palpation of, 91
Codeine, 390
Coitus, difficult, 866
  evidences of, 966
  obstruction to, 866
  pain in, 866
  violence in, 248
Cold in gynecologic treatment, 204
Cold-water coil, 205
Colpeurynter, 227
Colpocele, 163, 370, 392
Conception, 869
Condylomata, 164, 328
  excision of, 331
  lata, 301
  multiple, 328
  of external genitals, 328
  of vulva, 164, 328
  syphilitic, 300
Cones, vaginal, 214
Congenital anteflexion, 170, 550
  atresia of cervix, 173
  atresia of vagina, 163
  malformations, 163, 812
  split cervix, 444
Congestion of pelvis, 843

Congestive dysmenorrhea, 847
Conservative operation in salpingitis, 940
    on Fallopian tubes, 940
  surgery, definition for, 940
    indications for, 941
    of Fallopian tubes, 940
    of ovaries, 940
    of uterus, 940
    reasons for, 941
Constipation, 954
Constitutional treatment, 841
Constriction, waist, 228
Continuous sutures, 384
Contour of abdomen, 13
Contraindications for abdominal section, 922 (*See* Abdominal section)
  for curettage, 88
  for operation, 922
  to marriage, 252
Contusion of vulva, 348
Corpus albicans, 752
  luteum, 751
  luteum, cyst of, 765
  uteri, 430
    adenocarcinoma of, 632
    amputation of, 943
    cancer of, 632
    carcinoma of, 632 (*See* Carcinoma)
    classification of diseases of, 430
    infection of, 409
    in gynecologic diagnosis, (*See* Diagnosis)
    malignant disease of, 632
Corset, 228
Counterirritation in gynecologic treatment, 205
Crab louse, 278
Credé's ointment, 222
Criminal abortion, 6, 971
  trials, 971
Crossen's gauze-strip sponges, 926
  puncturing tenaculum forceps, 535
  retrodisplacement operation, 535
Crown suture, 384
Culdesac of Douglas, 4
Cup and belt pessaries, 547
Curet, 87, 479
  examination with, 87, 115
  uterine, 87, 479
Curettage, 115, 223, 477
  after-treatment in, 481
  contraindications for, 88
  dangers of, 88
  diagnostic, 87, 115
  effects of, 481
  exploratory, 87, 115
  for endometritis, 477
  in cancer, 630
  in doubtful cases, 115
  in endometritis, 477
  in fibromyoma, 590
  in tuberculosis, 493
  indications for, 115
  instruments for, 477
  preparation for, 477
  steps in, 477
  technic of, 477
  therapeutic, 476
Curetting, microscopic examination of, 117
Cylindrical speculum, 80
Cyst, cervical, 457
  chocolate, 784
  corpus luteum, 765
  dermoid, 776
  endometrial, of ovary, 779
  follicular, 763
  hydatid, 497
  inflammation of, 799
  intraligamentary, 177
  multilocular ovarian, 775
  of broad ligament, 177, 805
  of clitoris, 339
  of corpus luteum, 765
  of external genitals, 339
  of Morgagni, 761
  of vagina, 340
  of vulva, 339
  of vulvovaginal gland, 326
  ovarian 763
  pancreatic, 143
  papillary, 774
  parovarian, 177, 807
  proliferating, 767
  pseudomucinous, 767
  rupture of, 799
  serous, of ovary, 772
  tuboovarian, 766
  vaginal, 177
  vulvovaginal, 326
Cystadenomata of ovary, 767, 772
Cystic degeneration, 434
  of cervix uteri, 434, 457
  of myoma, 560
Cystocele, 163, 372, 393
  causes of, 393
  diagnosis of, 163, 393
  operation, technic of, 393
  treatment of, 393
Cystoscopic examination, 108

D

Dam, rubber, 950
Dangers in abdominal section, 923 (*See* Abdominal section)
  of curetment, 88
Decidual remnants, 119
Deep percussion of abdomen, 27
Degeneration, calcareous, of fetus, 187
  cystic, of cervix, 434
    of myoma, 560
    of ovary, 763
  fatty, 560
  follicular, of cervix, 434
  malignant, 600
  myxomatous, 560
  of myomata, 560
Delayed menstruation, 865
Delayed puberty, relation to internal secretion, 898
Denudation for repair of cervix, 454
  for repair of pelvic floor, 386
  in cervix operations, 454
  in fistula, 397
  in pelvic floor operations, 386
Dermatitis, 268

Dermoid cyst of ovary, 658, 776, 801
Detached sponges, 926
Development of Fallopian tubes, 815
  of hymen, 815
  of ovaries, 815
  of uterus, 499, 815
  of vagina, 815
Diagnosis, abdominal, 133, 181, 190
  anesthesia for, 112
  bloody discharge from genitals, 160
  external genitals in, 157
  gynecologic, 132
    abdomen in, 132
      discoloration, 144
      dullness, 152
      mass, 150
      movement, 143
      prominence, 133
      tenderness, 145
      tension, 144
    backache in, 195
    cervix uteri in, 170, 189
      discharge, 189
    displacement, 58, 172
      distortion, 170
      enlargement, 170
      erosion, 189
      eversion of mucosa, 443
      fixation, 171
      hardening, 170
      laceration, 443
      mass in canal, 171
      softening, 170
      tenderness, 170
    corpus uteri in, 52, 172
      changes in, 172
      displacement, 58 172
      enlargement, 58, 172
      fixation, 59, 173
      hard nodules, 173
      softening, 58, 173
      tenderness, 59, 173
    external genitals in, 157
      inflammation of, 161
      lacerations of vulva and perineum, 163
      malformation of, 163
      swelling about, 163
      ulcer of, 162
    function, disturbances in, 198
    methods of, 132
    pain in pelvis in, 190
    pelvic mass in, 173, 190
      mass high in pelvis, 181
        in center, firm, 187
        in center, fluid, 188
        in left side, firm, 186
        in left side, fluid, 187
        in right side, firm, 181
        in right side, fluid, 184
      mass low in pelvis, 173
        behind cervix, firm, 178
        behind cervix, fluid, 179
        in front of cervix, firm, 180
        in front of cervix, fluid, 180
        filling pelvis, firm, 181
        filling pelvis, fluid, 181
        to left of cervix, firm, 178

Diagnosis, gynecologic, mass low in pelvis,—Cont'd
        to left of cervix, fluid, 178
        to right of cervix, firm, 173
        to right of cervix, fluid, 176
    vaginal, 167, 189
      bleeding area, 189
      congestion, 189
      mass, 168
      roughening, 167
      tenderness, 167
      ulcer, 158
    vulvar, 167
      discharge, 157, 160
      inflammation, 161
      laceration, 163
      malformation, 163
      swelling, 163
      ulcer, 157
  method of, 132
  of amenorrhea, 831
  of ascites, 138 (*See* Ascites)
  of chancroid, 294
  of cystocele, 163, 393
  of endometritis, 470, 475
  of extrauterine pregnancy, 729
  of fibromyoma, 582
  of gonorrhea, **254**
  of imperforate hymen, 163, 817
  of kraurosis vulvae, 351
  of leucorrhea, 157
  of menopause, 830
  of menorrhagia, 843
  of menstruation, 829
  of metrorrhagia, 879
  of ovarian cysts, 787
  of peritonitis, 656
  of pregnancy, 112
  of pruritus vulvae, 355
  of retrodisplacement, 505
  of salpingitis, 656, 690
  of suppuration of abdominal wound, 955
  of syphilis, 289
  of tubal pregnancy, 729
  of urethral caruncle, 321
  of vaginitis, 254, 281, 288
  of vulvitis, 269
  reflected pains in, 198
  ulcer of external genitals, 162
Diagnostic curetment, 87, 115
Diagrams in records, 9
Diet, 235, 947
Difficult coitus, 866
Diffuse fibromyoma, 562
Digestive system, 911
Digital examination, 37, 167
    rectal, 113
    uterine, 119
    vaginal, 37
  palpation, 37, 167
Dilatation, 37, 167
  acute, of stomach, 953
  of cervix uteri, 223
  of vaginal orifice, 358
Dilating forceps, 85, 477
Dilators, uterine, 85, 477
Diphtheritic vaginitis, 286
Diphtheritic vulvitis, 274

- Diplococcus of gonorrhea, 256
- Directions for giving nutritive enemata, 673
- Discharge, 33, 157
  - bloody, 33, 879
    - causes of, 879
    - treatment of, 880
  - from vulvovaginal gland, 33
  - mucoepithelial, 33
  - mucopurulent, 33
  - purulent, 33
  - securing, for bacteriologic examination, 33
  - urethral, 33
  - watery, 36
- Discoloration of abdomen, 144
- Disease, echinococcus, of uterus, 496
    - of pelvis, 746
  - gynecologic, relation of insanity to, 712
  - hydatid, 497
  - insanity from, 712
  - malignant, of uterus, 600
  - marriage as cause of, 160
- Diseases, of appendix, 182
  - of broad ligaments, 807
    - parovarian cysts, 807
  - of cecum, 182
  - of external genitals, 239
    - abscess of vulvovaginal gland, 322
    - adhesions, 358
    - chancroid, 291
    - condylomata, 164, 328
    - cyst of vulvovaginal gland, 326
    - cysts, 339
    - eczema, 274
    - erysipelas, 272
    - follicular vulvitis, 271
    - gangrene, 274
    - gonorrhea, 251
    - hematoma, 346
    - hernia, 342
    - herpes, 277
    - hydrocele, 345
    - injuries, 348
    - intertrigo, 276
    - kraurosis vulvae, 350
    - lacerations, 163
    - malformations, 163
    - malignant disease, 310
    - pediculosis, 278
    - periurethral abscess, 318
    - prolapse of urethral mucosa, 320
    - prurigo, 278
    - pruritus vulvae, 354
    - pudendal hernia, 342
    - pudendal hydrocele, 345
    - scabies, 279
    - sinus of vulvovaginal gland, 325
    - stasis hypertrophy, 332
    - syphilis, 297
    - tuberculosis, 306
    - tumors, 310, 337
    - ulcers, 36, 162, 289
    - ulcus rodens vulvae, 317
    - urethral caruncle, 321
    - urethritis, 255, 318
    - varicose veins, 348
    - vulvitis, 268, 271
  - of Fallopian tubes, 652, 677, 713, 715, 744
    - catarrhal salpingitis, 652

- Diseases of Fallopian tubes,—Cont'd
    - displacements, 652
    - neoplasms, 744
    - salpingitis, 652, 677
  - of intestines, 187
  - of kidneys, 185
  - of labia, 162, 239
  - of liver, 149
  - of ovaries, 651, 675, 747
    - acute ovaritis, 652
    - carcinoma, 801
    - chronic ovaritis, 689
    - cystic tumors, 763
    - cysts of corpus luteum, 765
    - dermoid cysts, 776
    - fibroma, 801
    - follicular cysts, 763
    - hemorrhage, 741
    - inflammation, 652, 677, 689
    - oophoritis, 652
    - ovaritis, 652, 689
    - papillary cysts, 772
    - papillomata, 774
    - paroophoritic cysts, 805
    - prolapse, 690
    - sarcoma, 801
    - solid tumors, 801
  - of peritoneum, 187
  - of spleen, 151
  - of ureters, 176
  - of urethra, 251
    - caruncle, 321
    - polypi, 321
    - prolapse, 321
    - suburethral abscess, 319
    - urethritis, 318
  - of uterus, 409
    - anteflexion, 550
    - cancer of body, 632
    - cancer of cervix, 600
    - cervical polypi, 463
    - classification, 430
    - displacements, 172, 499
    - echinococcus disease of, 496
    - endocervicitis, 432, 434
    - endometritis, 469, 472
    - eversion of cervix, 438
    - fibromata, 553
    - gonorrheal endometritis, 469
    - hyperinvolution, 490
    - hyperplasia of endometrium, 464
    - hypertrophy of cervix, 460
    - hypertrophy of myometrium, 486
    - inflammation, 469
    - inversion, 541, 552
    - lacerations of cervix, 443
    - localization, 430
    - metritis, chronic, 488
    - posterior versions and flexions, 501
    - prolapse, 535
    - sarcoma, 642
    - septic endometritis, 469
    - subinvolution, 481
    - syphilis, 494
    - tuberculosis, 491
    - ulcer of cervix, 441
  - of vagina, 239
    - acquired atresia, 818

Diseases of vagina,—Cont'd
    acquired stenosis, 818
    adhesive vaginitis, 286
    cancer, 314
    chancroid, 291
    cystocele, 393
    cysts, 340
    diphtheritic vaginitis, 286
    emphysematous vaginitis, 286
    fibromata, 338
    gonorrheal vaginitis, 251
    hernia, 340
    hyperesthesia of vaginal entrance, 357
    malignant, 314
    parasitic vaginitis, 285
    prolapse anterior wall, 392
    prolapse posterior wall, 392
    rectocele, 392
    sarcoma, 315
    senile vaginitis, 287
    simple ulcers, 158, 289
    simple vaginitis, 279
    syphilis, 297
    tuberculosis, 306
    tumors, 314
    vaginitis, 251, 279, 281
  of vulva, 239
    adhesions of clitoris, 163, 359
    adhesions of labia, 163, 359
    anterior hernia, 342
    benign tumors, 337
    cancer, 310
    chafing, 276
    chancre, 291
    chancroids, 291
    condylomata, 328
    cysts, 339
    cysts of vulvovaginal glands, 326
    diphtheria, 274
    eczema, 274
    edema, 163
    elephantiasis, 164, 334
    erysipelas, 272
    fibroma, 337
    follicular vulvitis, 161, 268
    gangrene, 274
    gonorrheal vulvitis, 161, 251
    hematoma, 164, 346
    herpes, 277
    hypertrophy of clitoris, 338
    inflammation of ducts of vulvovaginal glands, 322
    inflammation of vulvovaginal glands, 322
    inguino-labial hernia, 342
    intertrigo, 276
    kraurosis vulvae, 350
    lipoma, 338
    malignant, 310
    myoma, 337
    myxoma, 338
    parasitic diseases, 278
    phlegmonous vulvitis, 273
    prurigo, 278
    pruritus vulvae, 354
    sarcoma, 310
    simple ulcers, 157
    simple vulvitis, 161, 268
Diseases of vulva,—Cont'd
    stasis hypertrophy, 164, 332
    syphilis, 297
    tuberculosis, 304
    tumors of clitoris, 338
    ulcus rodens vulvae, 317
    vaginismus, 357
    varicose veins, 164, 348
    venereal ulcers, 289
    verrucae, 328
  of vulvovaginal gland, 322
    abscess, 322
    cyst, 326
    inflammation, 322
  urethral, 34
  venereal, 251, 291, 297, 494
Disinfection, hand, 933
    methods of, 933
  in examination, 125
  of abdomen, 925
  of vagina, 376, 477
  of vulva, 376
Disorders of menstruation, 827 (*See* Menstruation)
Displacement, classification of causes of, 501
  of kidneys, 182
  of ovaries, 688
  of uterus, 172, 499
    anteflexion, 550
    as a whole, 499
    backward, 501
    classification, 501
    inversion, 541, 552
    normal position of uterus, 500
    of primary importance, 501
    of secondary importance, 550
    pessaries in treatment, 511
    posterior flexions, 501
    posterior versions, 501
    prolapse, 535
    retrodisplacement, 501
    retroflexion, 501
    retroversion, 501
    supports of uterus, 500
  posterior, 501
Dissecting forceps, 377
Distended bladder, 140, 152
Distention, intestinal, 136
  of abdomen, 136
Disturbances, functional, 827
  sexual, 869
Diverticulum of urethra, 318
Dorsal posture, 31
Double uterus, 820
  vagina, 163, 819
Douche, hot vaginal, 208
  in care of pessary, 519
  intrauterine, 223
  pitcher, 959
  vaginal, 206
Douglas, cul-de-sac of, 4
Drainage, abdominal 950
  after-treatment in, 950
  capillary, 950
  dressings in, 951
  gauze in, 952
  glass tube in, 950

- Drainage,—Cont'd
  - in abdominal section, 950 (*See* Abdominal section)
  - in pelvic abscess, 662
  - in peritonitis, 668, 672
  - of bladder, 408
  - peritoneal, 668, 672
  - rubber tube, 663, 952
  - split-tube, 952
  - vaginal, 662
- Drains rubber 663, 950
- Dress corrections, 228
  - in gynecologic treatment, 228
- Dressings, abdominal, 936 (*See* Abdominal dressings)
  - in drainage, 951
  - vulvar, 959
- Dry heat in gynecologic treatment, 203, 695
- Ducrey bacillus, 291
- Duct of Gartner, 814
  - of Mueller, 812
  - oviducts, 4, 644
  - vulvovaginal gland, 33
  - Wolffian, 812
- Dudley's operation for dysmenorrhea, 860
- Dullness in abdomen, 27, 152 (*See* Abdomen)
  - in ascites, 152
- Duration of menopause, 830
  - of menstruation 829
- Dysmenorrhea, 846
  - causes of, 849, 863
  - Dudley's operation for, 860
  - in the married, 863
  - in the virgin, 849
  - membranous, 848, 851
  - Thielhaber operation for, 860
  - treatment of, 856, 864
  - varieties of, 847
- Dyspareunia, 866
  - treatment of, 868

E

- Echinococcus disease of pelvis, 746
  - of uterus, 496
- Ectopic gestation, 718 (*See* Extrauterine pregnancy)
- Eczema of external genitals, 274
- Edebohl's speculum, 477
- Edema, fulminating pelvic, 742
- Educated touch, 67
- Effects of curettage, 481
- Electrotherm, 204
- Elephantiasis of labia, 164, 334
  - of vulva, 164
- Elongation of cervix uteri, 460
- Emmenagogues, 836
- Emmet's operation for lacerated cervix, 451
  - for lacerated pelvic floor, 386
- Emphysematous vaginitis, 286
- Encysted fluid, 138, 155
- Endocervicitis, 432
  - acute, 158, 432
  - chronic, 159, 434, 620
  - diagnosis of, 432
  - gonorrheal, 432
- Endocrine glands, 882 (*See* Internal secretion)
  - adrenal bodies, 894
  - ovary, 888
  - pancreas, 896
  - parathyroid, 893
  - pineal gland, 895
  - pituitary, 894
  - placenta, 896
  - thymus, 895
  - thyroid, 892
- Endocritic examination, 110
- Endometrial cysts of ovary, 779
- Endometritis, 469
  - acute, 469
  - applications for, 472, 476
  - bacteria in, 469
  - causes of, 469, 473
  - chronic, 159, 472, 620
  - curettage for, 476, 477
  - diagnosis of, 470, 475
  - exfoliative, 851
  - fungous, 474
  - glandular, 474
  - gonorrhea of, 469
  - hemorrhagic, 474
  - infected, 434
  - interstitial, 475
  - pathology of, 469, 473
  - polypoid, 474
  - prophylaxis of, 469
  - septic, 469
  - symptoms of, 470, 475
  - treatment of, 471, 476
  - tuberculous, 476
- Endometrium, anatomy of, 415
  - at menstruation, 416
  - carcinoma of, 632
  - epithelium of, 415
  - glands of, 416
  - gonorrheal, 469
  - hyperplasia of, 464
  - inflammation of, 469
  - of adult, 415
  - of infant, 415, 420
  - pathologic changes, 428
  - regeneration of, 481
  - senile, 420
  - tuberculosis of, 476, 491
- Endothelioma, 633
- Enemata, laxative, 954
  - nutritive, 673
  - postoperative, 673, 946
  - preoperative, 925
- Enlarged liver, percussion of abdomen in, 149
  - spleen, percussion of abdomen in, 151
  - uterus, percussion of abdomen in, 150
- Enterocele, vulvar, 343
- Enteroclysis, 672
- Epithelioma of cervix, 600
  - of vagina, 314
  - of vulva, 310
- Epithelium of cervical mucosa, 431
  - of endometrium, 415
  - of vagina, 250
  - of vulva, 243
- Erect posture, 2

Ergot in fibromyoma, 590
Erosion, follicular, 440
  of cervix uteri, 438, 618
  papillary, 440
Erysipelas of external genitals, 272
Esthiomene, 317
Ether, for operation, 932
Eversion of cervical mucosa, 443
  causes of, 443
  diagnosis of, 447
  treatment of, 449
Examination, gynecologic, 1 (*See* note under Index)
  abdominal, 12, 133
    anatomy, 12
    inspection, 13
    palpation, 14
    regions, 15
    special points of tenderness, 18, 21
    mass, 23
    fluid wave, 25, 26
    fat wave, 25, 26
    percussion, 27
    auscultation, 29
    mensuration, 30
    prominence, 12, 133
      obesity, 133
      mass in wall, 133, 135
      ventral hernia, 135
      relaxation of wall, 136
      separation of recti, 136
      tympanites, 137
      fecal impaction, 138
      ascites, 138
      encysted fluid, 138
      pregnant uterus, 140
      distended bladder, 140
      pelvic tumor, 142
      abdominal tumor, 143
    discoloration of wall, 14, 144
    movement of wall, 143
    tenderness, 18, 145
    tension of abdomen, 14, 144
      in right lower abdomen, 145
      in left lower abdomen, 148
      in central lower abdomen, 148
      in lumbar region, 149
      in right upper abdomen, 149
      in left upper abdomen, 149
      in central upper abdomen, 150
      in umbilical region, 150
      diffuse, 150
    mass felt, 23, 150
      in right lower abdomen, 150
      in left lower abdomen, 151
      in central lower abdomen, 151
      in right upper abdomen, 151
      in left upper abdomen, 151
      in central upper abdomen, 152
    dullness, 27, 152
      from liver, 153
      from spleen, 153
      from pregnant uterus, 152
      from distended bladder, 152
      from ascites, 153
      from encysted fluid, 155
      from pelvic tumor, 155
      from abdominal tumor, 155

Examination, abdominal dullness,—Cont'd
      from kidney tumor, 156
      from perirenal lipoma, 157
  of external genitals, 31, 157
    anatomy, 32, 157
    discharge, 33, 157
    inflammation, 36, 161
    ulcer, 36, 162
    swelling, 36, 163
    new growth, 37
    malformation, 163
    hymen, 37
    perineum, 37
    laceration, 37, 163
  vaginal (digital), 37, 168
    method, 37
    vaginal walls, 40, 77
    base of bladder, 41
    urethra, 41
    vulvovaginal gland, 42
    pelvic floor, 42
    rectum, 45
    cervix uteri, 46, 170
    pericervical tissues, 50
  vaginoabdominal (bimanual), 50, 172
    uterus, 52, 172
      position, 52, 172
      size, 52, 172
      shape, 52
      consistency, 52, 173
      tenderness, 52, 173
      mobility, 52, 173
      attachments, 52, 173
      displacement, 172
      enlargement, 172
      softening, 173
      hard nodules, 173
    lateral regions, 59
      tube, 63
      ovary, 63
      ureter, 66
    educated touch, 67
    train one hand, 69
    use two fingers, 69
    deep examination, 69
    drawing down uterus, 70
    position of examiner, 71
    varying conditions, 71
    intestines in way, 71
    diminish tenderness, 72
    mass or induration, 173
      in cervical canal, 171
      in right lower, firm, 173
      in right lower, fluid, 176
      in left lower, 178
      behind, firm, 178
      behind, fluid, 179
      in front, lower, firm, 180
      in front lower, fluid, 180
      filling lower pelvis, firm, 181
      filling lower pelvis, fluid, 181
      in right side, high, firm, 181
      in right side, high, fluid, 184
      in left side, high, 186
      in median, high, firm, 187
      in median, high, fluid, 188
  rectoabdominal palpation in, 88
    disadvantage, 88

- Examination, rectoabdominal palpation in,—Cont'd
    - when useful, 89
  - of virgin, 89
  - rectovaginoabdominal, 90
  - palpation of coccyx in, 90
  - instrumental, 73
    - by speculum, 73, 187
      - instruments 73
      - steps, 75
      - information to obtain, 77
      - difficulties, 79
      - cylindrical speculum, 80
      - Sims' speculum, 80
    - by excision of tissue, 84
    - by sounding uterus, 84
      - steps, 84
      - indications, 85
      - contraindications, 86
      - information to obtain, 85
    - by curetting, 87
    - of vaginal walls, 189
      - congestion, 189
      - bleeding, 189
      - ulcer, 189
    - of cervix, 189
      - normal, 189
      - discharge, 189
      - lacerated, 189
      - eroded, 189
      - malignant disease, 189
  - x-ray, 91
    - patency of tubes, 91
    - fetal bone shadows, 97
    - pelvic pneumoperitoneum for diagnosis, 98
  - under anesthesia, 112
    - preparations, 112
    - vaginoabdominal palpation, 112, 172
    - rectoabdominal palpation, 113
    - rectovaginoabdominal palpation, 115
    - rectovesical palpation, 115
    - curettage, 115
    - collecting curettings, 117
    - exploration of interior of uterus with finger, 119
    - excision of tissue, 120
    - inspection of uterine interior, 120
  - radiography, 91
  - preparations for, 120
    - office arrangements, 121
    - directions to patient, 121
    - antiseptic preparations, 122
    - soap, 124
    - brushes, 124
    - lubricant, 124
    - rubber gloves, 125
    - specimens, 126
- Examination, abdominal, 12, 133 (*See* note under Index)
  - abdominorectal, 88
  - abdominovaginal, 50, 172
  - anesthesia for, 112
  - antisepsis in, 122
  - antiseptic preparations for, 122
  - auscultation, 29
  - backache, localization of, 31
  - bacteriologic, 33
    - for gonococci, 435
- Examination, bacteriologic,—Cont'd
    - securing discharge for, 33
  - bimanual, 50, 67, 112, 172
    - of uterus, 52
  - brush in, 125
  - by lamp, 79
  - cystoscopic, 108
  - deep, 69
  - digital, of vagina, 37
  - disinfection in, 122
  - educated touch, 67
  - endocritic, 110
  - exposure, avoid, 126
  - gas insufflation in, 91
  - gloves in, 38
  - gynecologic, 1, (*See* note under Index)
  - history in, 1
  - in bed, 126
  - in standing posture, 46
  - inspection of abdomen, 13
  - instrumental, 73
    - by curet, 87
    - by cylindrical speculum, 80
    - by excision, 84, 120
    - by Sims' speculum, 80
    - by sound, 84
    - by speculum, 73
  - intestinal, 109
  - intestines, getting out of way, 71
  - intrauterine, asepsis in, 123
  - judgment in, 10
  - knee-chest posture in, 72
  - left hand in, 69
  - lubricant, 125
  - mensuration of abdomen, 30
  - methods of, 11
  - methods, classification of, 11
  - microscopic, of curetting, 117, 620
    - of excised tissue, 117, 620
    - of pus, 33, 255
  - neurologic, 109
  - of abdomen, 11
  - of Bartholin's glands, 33
  - of bladder base, 41
  - of blood, 110
  - of cervix uteri, 46
  - of coccyx, 90
  - of endocrine gland system, 110
  - of external genitals, 31, 157
  - of fallopian tubes, 63
  - of hymen, 37
  - of kidney, 182
  - of nervous system, 109
  - of ovary, 63
  - of pelvic floor, 42
  - of pericervical tissues, 50
  - of perineum, 37
  - of rectum, 45
  - of ureter, 66
  - of urethra, 41
  - of uterus, 52
  - of vagina, 37
  - of vulva, 31
  - of vulvovaginal glands, 42
  - office arrangements for, 121
  - order of, 11
  - palpation of abdomen, 14
  - pelvic, 42, 112

Examination, pelvic,—Cont'd
    peritoneum in, 98
  percussion, 27
  physical, 11
  position for examiner, 71
  preparations for, 120
  proctoscopic, 109
  radiography in, 91
  record of, 9
  rectal, 45, 113
  rectoabdominal, 88, 113
  rectovaginoabdominal 90, 115
  rectovesical, 115
  rubber gloves in, 125
  soap in, 124
  specimens from, 126
  speculum, 73
  tenderness in, 72
  train one hand, 69
  two fingers in, 69
  tympanites in, 137
  under anesthesia, 115
    curettage, 115
    digital, of uterine cavity, 119
    excision of tissue, 120
    rectoabdominal, 113
    rectovaginoabdominal, 115
    rectovesical, 115
    vaginoabdominal, 112
  uterine digital, 119
  vaginal, 37, 168
    asepsis in, 122
  vaginoabdominal, 50, 112, 172
    fallopian tubes, 63
    general observations, 51
    lateral regions, 59
    other regions, 65
    ovaries, 63
    uterus, 52
  when required, 10
  x-ray, 91
Examining fingers, 38
  hand, 38
  table, 131
Excessive menstruation, 843
Excised tissue, microscopic examination of, 117, 620
Excision, examination by, 84
  of condylomata, 331
  of vulva, 331
    technic of, 331
  of warts, 330
Exercise, 231, 835, 949
Exfoliative endometritis, 851
  vaginitis, 289
Exploration, intrauterine, 119
  of uterus, 84, 87
Exploratory abdominal section, 624, 921 (*See* Abdominal section)
  curettage, 87, 115
  vaginal section, 938
External genitals, 239
    abscess of vulvovaginal gland, 322
    adhesions of, 358
    anatomy of, 32, 239
    blood vessels of, 247
    caruncle of, 321
External genitals,—Cont'd
    cellulitis of vulva, 273
    chancroid of, 291
    condylomata of, 164, 328
    cysts of, 326, 339
    diphtheritic vulvitis, 274
    discharge about, 31
    diseases of, 239 (*See* Diseases)
    eczema of, 274
    erysipelas of, 272
    examination of, 31, 157
    follicular vulvitis, 271
    gangrenous vulvitis, 274
    gonorrhea of, 251
    granuloma inguinale, 307
    hematoma of, 346
    hernia of, 342
    herpes of, 277
    hydrocele of, 345
    hyperesthesia of, 357
    inflammation of, 36, 161, 322
    injuries of, 348
    inspection of, 31, 157
    intertrigo of, 276
    kraurosis vulvae, 350
    lacerations of, 163
    malformations of, 163
    malignant disease of, 310
    newgrowths, 37
    pediculosis of, 278
    periurethral abscess of, 318
    prurigo, 278
    pruritus vulvae, 354
    pudendal hernia, 342
    sinus of vulvovaginal gland, 325
    swelling of, 36, 163
    stasis hypertrophy, 332
    syphilis of, 297
    tuberculosis of, 304
    tumors of, 310, 337
    ulcers of, 36, 162, 289
    ulcus rodens of, 317
    urethral caruncle, 321
      mucosa, 320
    urethritis of, 255, 318
    varicose veins of, 348
    vulvitis, 268, 271
Extirpation of vulva, 331
Extracts, animal, 234, 905
  of ovary, 760
Extrauterine fetus, 187
  gestation, 718
  pregnancy, causes of, 718
    abdominal, 728
    ampullar, 720
    diagnosis of, 729
    hemorrhage in, 724
    interstitial, 727
    ovarian, 727
    pain in, 731
    shock from, 733
    signs of, 735
    symptoms, 729
    treatment of, 738
    wandering, 727
Exudates, 174
  pelvic, 652, 678

F

Face mask for operator, 932
Fallopian tubes, 644
  accessory, 719
  adenomyomata of, 567
  adhesions of, 861
  amputation of, 940
  anatomy of, 644
  anomalies of, 719, 816
  carcinoma of, 744
  conservative operations on, 940
  conservative surgery of, 940
  development of, 815
  determining patency of, 92
  diseases of (*See* Diseases)
  examination of, 63
  hemorrhage from, 741
  infection of, 652
  inflammation of, 652
  malformation of, 816
  malignant disease of, 744
  neoplasms of, 744
  occlusion of, 678
  palpation of, 63
  papilloma of, 744
  resection of, 943
  rudimentary, 719
  rupture of, 723
  tuberculosis of, 715
  tumors of, 744
Fat in abdominal wall, 133 (*See* Abdominal wall)
Fatty degeneration, 560
Fecal fistula, 395
  impaction, 138
Feeding in peritonitis, 670
Female form, 2
Fermentation fever, 955
Fetal bone shadows, x-ray showing, 97
Fetal heart sounds, 29
  movements, 27, 143
  uterus, 412
Fetus, calcareous degeneration of, 187
  extrauterine, 187
Fever, aseptic, 955
  fermentation, 955
Fibroid (*See* Myoma)
Fibroid tuberculosis, 714
Fibroma of labia, 338
  of ovary, 801
Fibromyoma, 553 (*See* Myoma)
Fibromyomata, multiple, 557
Fingers, examining, 38
Fissure, anal, 45
Fistula, 360, 395
  classification of, 395
  denudation in, 397
  fecal, 395
  postoperative, 957
  rectovaginal, 395
  ureterovaginal, 399
  urethrovaginal, 399
  vaginorectal, 395
  vaginovesical, 399
  vesicovaginal, 399
    treatment, 401
  vesicouterine, 407
Fistula,—Cont'd
  ureteral, 407
  ureterouterine, 407
Fixation of uterus, 523, 624
  ventral, 529
Fixing specimens, 126
Flaxseed poultice, 203
Flexible ring pessary, 522
Flexion of uterus, 504
Floor, pelvic, 42, 360
Fluid, encysted, 155
Fluid wave, 25
Follicles, graafian, 748
Follicular cysts, 763
  degeneration of cervix, 434
  erosions, 440
  vulvitis, 161, 268, 271
Folliculi, hydrops, 763
Footrests, adjustable, 131
Forceps, artery, 377
  Crossen's puncturing tenaculum, 535
  dilating, 85, 477
  dissecting, 377
  hemostatic, 377
  sponge, 377
  tenaculum, 477
  tissue, 377
  uterine, 477
  uterine tenaculum, 75
  vaginal, 477
Foreign bodies in abdomen, 937, 971
    in uterus, 859
  protein treatment, 234, 659, 673
Form, female, 2
Fourchette, 242
Fowler position, 672, 952
Friction rubbing, 27, 227
  sound, 29
Fulminating pelvic edema, 742
Function, testing, of kidney, 924
Functional disturbances, 198, 827
Fungous endometritis, 474
Fürbringer's method, 933

G

Gall-bladder, 141, 149
Gangrenous vulvitis, 274
Gartner, canal of, 814
  duct of, 814
Gas apparatus, 92
Gas in intestines, 137
  insufflation, selection of cases for, 100
    through Fallopian tubes, 92
    uterine, position of patient for, 95
Gauze drainage, 952
  in drainage, 952
  iodoform, 667
  packing, 214
  strip sponges, 926
  tampons, 214
Gehrung pessary, 543
General anesthesia, 112, 934
  peritonitis, 666
Genitalia, 239
Genitals, external, 239
  blood vessels of, 247
  diseases of, 239 (*See* Diseases)
  examination of, 31, 157 (*See* Examination

Gestation, ectopic, 718 (*See* Extrauterine pregnancy)
  extrauterine, 718
  in septate uterus, 822
  in uterine horn, 177
  tubal, 718
Gilliam-Crossen operation, 531
Gilliam-Ferguson operation, 531
Gilliam operation, 530
Gland duct, vulvovaginal, 33
Glands, Bartholin's, abscess of, 165, 322
    anatomy of, 33, 244
    examination of, 33
    palpation of, 35
  internal secretory, 882
  lymphatic, 426
  of cervix, 416
  of endometrium, 416
  Skene's, 244
    infection of, 263
    of urethra, 244
  vulvovaginal, 33, 244
    abscess of, 322
    anatomy of, 34, 244
    carcinoma of 327
    cysts of 326
    discharge from, 33
    examination of, 42
    gonorrhea of 263
    infection of, 33, 322
    inflammation of, 322
    palpation of, 33
Glandular endometritis, 474
Glass drainage tube, 950
Gloves, 38, 125, 932
  in examination, 38
  rubber, 38 (*See* Rubber gloves)
Glycerine, 125
Gnawing ulcer 317
Gonococci, bacteriologic examination for, 255
Gonococcus, 255, 700
  staining, 255
Gonorrhea, 251
  cause of, 251
  chronic, 257
  diagnosis of, 254; serum test, 111
  diplococcus of, 256
  fixation test, 111
  gonococcus, 255
  in children, 266
  in pelvis, 700
  latent, 252
  of external genitals, 36, 251
  of Fallopian tubes, 700
  of vaginal vault, 264
  of vulvovaginal gland, 263
  of uterus, 469
  pathology of, 253
  symptoms of, 253
  treatment of, 258; vaccines, 266
Gonorrheal endocervicitis, 432
  endometritis, 469
  maculae, 255
  salpingitis, 700, 704
  urethritis, 255
  vaginitis, 255
  vulvitis, 255
Graafian follicles, 748
Gram's method, 256
Granuloma inguinale, 307
Graves' speculum, 73
Gynecologic diagnosis, 132 (*See* Diagnosis)
    abdomen in, 132
    backache in, 195
    cervix uteri in, 170, 189
    corpus uteri in, 172
    methods of, 132
    pain in pelvis in, 190
    pelvic mass in, 173
    vaginal, 167
    vulvar, 167
  disease, relation of insanity to, 712
  examination, 1
    abdominal, 12 (*See* Examination)
    bacteriologic, 255
    bimanual, 50, 172
    digital, 37, 167
    history in, 1
    instrumental, 73
    of external genitals, 31 (*See* Examination)
    order of, 11
    palpation of coccyx in, 90
    pelvic, 42
    physical, 11
    preparations for, 120
    record of, 9
    rectovaginoabdominal, 90, 115
    under anesthesia, 112
    vaginal, 37 (*See* Examination)
    vaginoabdominal, 50, 172 (*See* Examination)
    when required, 10
  postures, 229
  pressure treatment, 227
  records, 9
  therapy, 199
  treatment, 199
  treatment, internal, 233
    intrauterine, 218 (*See* Treatment)
Gynecology in relation to internal secretions, 882
Gynecology, x-ray in, 218

H

Hand brushes, 125
    sterilization of, 125
  disinfection, 933
    methods of, 933
  examining, 38
Hands, disinfection of, 125, 933
  sterilization of, 125, 933
Hard-rubber disk pessaries, 542
Head mirror, 80
Heart sounds, fetal, 29
Heat, 202 203, 695
Hegar's sign, 57
Hematocele, pelvic, 723, 738
Hematocolpos, 817
Hematoma, intraligamentary, 176
  of broad ligament, 176
  of external genitals, 346
  of vulva, 346
  pelvic, 176
  pudendal, 346

Hematoma,—Cont'd
  subperitoneal, 725
  vulvar, 164, 346
Hematometra, 817
Hemorrhage from Fallopian tube, 741
  from ovary, 741
  in cervical polypi, 463
  in extrauterine pregnancy, 723
  in fibroids, 574
  in tubal pregnancy, 723
  into cyst, 798
  intraperitoneal, 179, 723, 741
  pelvic, 741
  postoperative, 952
  shock from, 733
  subcutaneous, 346
  tampon for, 217
  treatment for, 738
  uterine, 160
  vulvar, 346
Hemorrhagic endometritis, 474
Hemostatic forceps, 377
Hermaphroditism, 823
Hernia, 342
  abdominal, 135
  inguinal, 342
  inguinolabial, 342
  of external genitals, 342
  postoperative, 957
  pudendal, 342
  umbilical, 135
  vaginal, 340
  vaginolabial, 343
  ventral, 135
  vulvar, 342
Herpes of external genitals, 277
  of vulva, 277
Hewitt pessary, 546
History cards, 9
  in examination, 1
  marriage in the, 4
  record, 3, 9
  taking, 1
Hodge pessary, 511
Holder, leg, 131
Home, operation in, 923
Horizontal posture, 13
Hormones, 885
Hospital, operation in, 923
Hot air chamber, 204, 695
  therapy, 696
  pastes, 202
  sitz-bath, 203
  stupes, 202
  vaginal douche, 208
  water bag, 203
    coil, 204
Hottentot apron, 335
Hyaline degeneration of myoma, 562
Hydatid cyst, 497
  disease, 497
  mole, 497
  Morgagni, 813
Hydatidiform mole, 497
Hydrocele of external genitals, 345
Hydronephrosis, 177, 185
Hydrops folliculi, 763
Hydrosalpinx, 177, 680, 684, 791
Hydrotherapy, 227
Hydroureter, 177, 185
Hygroscopic solutions, 212
Hymen, 37
  absence of, 967
  anatomy of, 157, 246
  anomalies of, 163, 817
  atresia of, 163
  development of, 815
  imperforate, 163, 817
  laceration of, 968
  malformation of, 163
  rudimentary, 968
Hyperesthesia of vaginal entrance, 357
Hyperfunction of ovary, 892
Hyperinvolution of uterus, 490
Hyperplasia of endometrium, 464
Hypertrophy of cervix uteri, 460, 540
  of clitoris, 338
  of labia, 164, 334
  of myometrium, 486
  stasis, 164, 334
    operation for, 337
  supravaginal, 468
Hypodermoclysis, 953
Hypofunction, ovarian, 891
Hypospadias, 816
Hysterectomy, abdominal, 594, 598
  partial, 943
  supravaginal, 594
  total, 594
  vaginal, 594
  varieties of, 594
Hysteria, 109, 855
Hysteric contraction of abdominal wall, 145

I

Ice bag, 204
Ichthyol, 212
Idiopathic hypertrophy of cervix, 460
Ileus, 954
Iliac thrombosis, 956
Illumination, 79
Imperforate hymen, 163, 817
  diagnosis of, 163, 817
  symptoms of, 818, 833
  treatment of, 818
Impotency, 869
Incision, 935
  abdominal, 935
    care, 932
    closure, 932
    dressing, 926, 947
    removing sutures, 948
    strapping, 947
    suturing, 932
  cervical, closure of, 454
  for cervix repair, 452
  for pelvic floor repair, 386
    Emmet's, 386
  perineal, closure of, 389
  suprapubic, 921, 935
Incomplete abortion, 6
Incontinence of urine, 408
Indecent assault, 961
Indications for abdominal section, 922 (See Abdominal section)

Indications,—Cont'd
  for conservative surgery, 940
  for knee-chest posture, 230
  for nutritive enemata, 673
  for operation, 922
  for repair of cervix, 451
  for repair of pelvic floor, 375
Induced abortion, 598
Induration, 173
Induration, vesical, 188
Infant, endometrium of, 415, 420
Infantile uterus, 410, 897
Infected endometritis, 434, 863
Infection, 644
  localized, 955
  of abdominal wound, 955
  of cervical wound, 456
  of cervix uteri, 432
  of corpus uteri, 469
  of Fallopian tubes, 652
  of lymphatics, 610
  of ovarian tumor, 799
  of ovaries, 652, 677, 689
  of peritoneum, 666, 797
  of Skene's glands, 263
  of urethra, 318
  of uterus, 409
  of vagina, 255, 279
  of veins, 655
  of vulva, 251
  of vulvovaginal glands, 33, 322
  puerperal, 469, 652
Infectious disease in relation to gynecology, 914
Inflammation, 644
  acute pelvic, 651 (*See* Acute pelvic inflammation)
  chronic pelvic, 676 (*See* Chronic pelvic inflammation)
  of endometrium, 469
  of external genitals, 36, 157
  of Fallopian tubes, 652
  of ovary, 652, 677, 689
  of pelvic connective tissue, 653, 687
  of urethra, 318
  of uterus, 409
  of vagina, 157, 251, 268
  of vulva, 157
  of vulvovaginal gland, 33, 322
  opiates in, 658
  pelvic, 149, 695
    prophylaxis of, 652
  purgatives in, 658, 695
  rest in, 200, 658
  retrodisplacement with acute, 523
    with chronic, 525
Inflated ring pessaries, 512, 521
Infundibular pregnancy, 720
Infusion, intravenous, 952
Inguinal hernia, 342
Inguinolabial hernia, 342
Injections, intrauterine, 223
  intravenous, 952
  subcutaneous, 952
  vaginal, 206
Injuries from labor, 365
  of bladder, 937
  of cervix, 443
Injuries,—Cont'd
  of external genitals, 348
  of intestines, 937
  of ureter, 937
  of uterus, 443
  of vulva, 348
Insanity from disease, 712
  postoperative, 712
  relation of, to gynecologic disease, 712
Inspection of abdomen, 13
  of external genitals, 31, 157
  of pelvic cavity, 921, 935
  of vaginal walls, 167
  of vulva, 31, 157
  of uterus, 52
Isthmial pregnancy, 720
Instrument sterilizer, 122
Instrumental examination, 73 (*See* Examination)
  by curet, 87, 115
  by excision, 84
  by Sims' speculum, 80
  by sound, 84
  by speculum, 73
Instrumentation, intrauterine, 84
Instruments, boiling, 123
  for curetment, 477
  for repair of cervix, 453
  for repair of pelvic floor, 377
  left in wound, 931
  sterilization of, 122
Interglandular relation, 885
Intermenstrual pain, 864
Internal genitals, maldevelopment of, 897
Internal secretions, 882
    and gynecologic therapy, 903
    cause of gynecologic anomalies, 896
    chemical nature, 884
    definition, 883
    historical facts, 882
    influence on genital apparatus, 887
    interglandular relation, 885
    relation to gynecology, 882
Internal treatment, 233
Interstitial endometritis, 475
  extrauterine pregnancy, 727
  gland, 888
  myoma, 556
  pregnancy, 720, 727
Intertrigo, 276
  of external genitals, 276
Intestinal distention, 137
  examination, x ray, 109
  movement, 143
  obstruction, 955
  paralysis, 954
  stasis, 911
  tenderness, 145
  tympany, 137
Intestines, adhesions of, 681
  diseases of, 187
  gas in, 137
  gurgling in, 29
  injuries of, 937
  in way in examination, 71
Intraligamentary cyst, 177
  myoma, 558
  hematoma, 176

Intramural myoma, 556
Intraperitoneal hemorrhage, 179, 723
Intrauterine applications, 218
  douche, 223
  examination, asepsis in, 123
  exploration, 119
  injections, 223
  instrumentation, 84
  treatment, 218 (*See* Treatment)
Intravenous infusion, 952
  injections, 952
Introduction of pessary, 516
Invagination of perineum and pelvic floor, 60
Invasion of peritoneal cavity, 921
Inversion of uterus, 541, 552
Iodine, 205
Iodoform gauze, 667
Irregular menstruation, 865
Irrigation, of uterine cavity, 223
  of vagina, 206
Ischuria, 954
Isthmic pregnancy, 720

J

Japanese stove, 203

K

Kidney, 147
  diseases of, 185
  displacement of, 182
  examination of, 182
  insufficiency, 954
  movable, 147
  pain in, 7
  palpation of, 182
  tenderness of, 22
  testing function of, 924
  tumor of, 183
  wandering, 182
Knee-chest posture, 229
  description of, 229
  in examination, 72
  in gynecologic treatment, 229
  in pelvic tumor, 231
  in prolapse, 231
  in puerperium, 231
  in retrodisplacement, 510, 519
  indications for, 230
Kraurosis vulvae, 161, 350
  causes of, 350
  diagnosis of, 351
  pathology of, 351
  prognosis of, 353
  symptoms of, 351
  treatment of, 353
  x-ray in, 353
Krukenberg tumor of ovary, 805

L

Labia, 157, 239
  adhesions of, 163, 359
  diseases of, 163
  development of, 815
  elephantiasis of, 334
Labia,—Cont'd
  fibroma of, 338
  hypertrophy of, 334
  majora, 239
  malformation of, 163
  minora, 241
    adherent, 163
  stasis hypertrophy of, 164, 334
  structure of, 241
Labor, injuries from, 365
Lacerated cervix, Emmet's operation for, 451
  pelvic floor, Emmet's operation for, 386
Lacerations, 163, 365
  of cervix, 159, 443
    causes, 443
    complications, 447
    diagnosis, 447
    examination, 448
    linear cauterization, 450
    operation, 451
    pathologic changes, 444
    symptoms, 447
    treatment, 449
    varieties, 444
  of external genitals, 163
  of pelvic floor, 163, 365
    causes, 366
  diagnosis, 42, 163, 367
    Emmet's operation, 386
    operation for, 360
    pathology, 367
    symptoms, 370
    treatment, 374
  of perineum, 163, 349, 365
  of sphincter ani muscle, 372
  of vulva, 163
Lamp, examination by, 79
Laparotomy, 921 (*See* Abdominal section)
Latent gonorrhea, 252
Lateral regions, palpation of, 59
Lavage, 670
Laxative enemata, 954
Laxatives, 233
Legholders, 131
Leucorrhea, 875
  causes of, 157, 875
  in children, 281
  in myoma, 574
  significance of, 157
  treatment of, 878
Levator ani muscle, 364
Life, change of, 830
Ligament, broad, 426
    tumor of, 184
    varicose veins of, 745
  round, 426
    anatomy, 426
    myoma of, 184
    operations on, 528
    transplantation of, 530
    tumor of, 184
  sacrouterine, 426
  uteroovarian, 752
  vesicouterine, 426
Ligatures, 377, 453
Lipoma of uterus, 599
  of vulva, 334

Liquid soap, 124
Liquor folliculi, 750
Lithopedion, 187, 729
Liver, diseases of, 149
  enlarged, percussion of abdomen in, 140
Local anesthesia, 72, 212
Localized infection, 955
  tenderness, 21
Louse, pubic, 278
Lubricants, 125
Lumbar backache,
Lupus vulvae, 304
  x-ray in, 306
Lymphangitis, 273
Lymphatic glands, 425
Lymphatics, infection of, 610
  of uterus, 426
  of vagina, 250
  of vulva, 247

M

Maculae, gonorrheal, 255
Maldevelopment of internal genitals. relation to internal secretion, 897
Malformations, 812
  congenital, 163, 812
  of bladder, 140, 816
  of cervix, 173
  of clitoris, 163
  of external genitals, 163
  of Fallopian tubes, 719, 816
  of hymen, 163, 817
  of labia, 163
  of ovary, 816
  of prepuce, 163, 358
  of urethra, 815
  of uterus, 820
    absence, 834
    bicornis, 820
    didelphys, 820
    double, 820
    duplex, 820
    infantile, 410, 897
    rudimentary, 820
    septate, 820
    unicornis, 820
  of vagina, 163, 818
  of vulva, 163
  pseudohermaphroditism, 823
Malignant degeneration, 600
  disease of cervix uteri, 600
    of corpus uteri, 632
    of external genitals, 286
    of Fallopian tubes, 744
    of myoma, 560
    of ovaries, 801
    of uterus, 600
    of vagina, 314
    of vulva, 310
Malposition of uterus, 172
Mammary gland preparations, 909
Marriage as cause of disease, 160
  contraindications to, 160
  sterility in, 869
Married, dysmenorrhea in the, 863
Mass in abdomen, 23, 150, 173 (*See* Abdomen)
  in lateral part of pelvis, 64
Massage in gynecologic treatment, 224
  pelvic, 224
    application, 224
    indications, 226
    contraindications, 227
Masturbation, 269
Materials for nutritive enemata, 673
Measurements, 30
Meatus uranarius, 244
Medicine, internal, 233
Medico-legal points in gynecology, 961
Membranous dysmenorrhea, 848, 851
Menge pessary, 543
Menopause, 420
  bleeding in, 830
  definition of, 830
  diagnosis of, 830
  duration of, 830
  metrorrhagia in, 830
  physical changes in, 420
  symptoms of, 830
  synonyms of, 830
  time for, 830
  treatment of, 830
Menorrhagia, 843
  causes of, 843
  diagnosis of, 843
  in myoma, 574
  pathologic significance of, 843
  relation to internal secretion, 899
  symptoms of, 843
  treatment of, 844
Menses, suppression of, 843
Menstruation, 416
  absence of, 831
  anomalies of, 899
  definition of, 827
  delayed, 865
  diagnosis of, 829
  disorders of, 827
    amenorrhea, 831
    delayed menstruation, 865
    dysmenorrhea, 846
    menorrhagia, 843
    metrorrhagia, 900
    precocious menstruation, 865
    retarded menstruation, 865
    vicarious menstruation, 865
  duration of, 829
  endometrium at, 416
  excessive, 843
  intermenstrual pain, 864
  irregular, 865
  normal, 827
  painful, 846
  physical changes in, 416
  physiologic significance of, 830
  precocious, 865
  relation of puberty to, 828
  retarded, 865
  scanty, 843
  synonyms of, 829
  time for, 828
  treatment of, 830
  vicarious, 865
Mensuration of abdomen, 30
Mesenteric cyst, 143

Metastasis, 611
  Fürbringer's, 933
  Gram's, 256
Methods in gynecologic treatment, 199
  nongynecologic examination, 108
  of diagnosis, 132 (*See* Diagnosis)
  of examination, 1
  of hand disinfection, 933
  of replacement, 510
Metritis, acute, 469
  chronic, 488
Metrorrhagia, 160
  causes of, 879
  definition of, 843
  diagnosis of, 879
  from abortion, 6, 880
  from cancer, 615
  from fibroid, 574
  from polyp, 463
  from tubal pregnancy, 730
  in menopause, 830
  relation to internal secretion, 900
  symptoms of, 843
  treatment of, 844
Microscopic examination of curetting, 117
  of excised tissue, 84
  of pus, 255
Mirror, head, 80
Miscarriage, 160
Moist heat in gynecologic treatment, 202
  warts, 328
Mole, hydatid, 497
Mons veneris, 239
Morgagni, cyst of, 761
Movable kidney, 147
  retrodisplacement, 510
Movement, intestinal, 144
  fetal, 27
  of abdomen, 143
  of abdominal wall, 143
Mucosa, cervical, epithelium of, 431
    eversion of, 435
  urethral, prolapse of, 320
Mucoepithelial discharge about external genitals, 33
Mucopurulent discharge, 33
Muellerian ducts, 812
Multilocular ovarian cyst, 775
Multiple condylomata, 328
  myomata, 557
Muscle, levator, ani, 364
Muscles, recti, 136
    separation of, 136
  transverse perineal, 361
Muscular system in relation to gynecology, 914
Mustard plaster, 205
Mycotic vaginitis, 285
Myoma, amyloid degeneration of, 560
  cervical, 553, 621
  cervix, 559
  classification of, 553
  complication, 586
  curettage, 590
  cystic degeneration of, 574
  degeneration of, 570, 572
  diagnosis, 582
  diffuse, 562
Myoma,—Cont'd
  hemorrhage in, 574
  interstitial, 556
  intraligamentary, 558
  intramural, 556
  metrorrhagia from, 574
  multiple, 557
  necrotic, 575, 576
  of round ligament, 184
  of uterus, radical treatment for, 553, 591
  pathology, 553
  pediculated, 558, 559
  pregnancy and, 597
  retroperitoneal, 558
  submucous, 559
  subperitoneal, 557
  symptoms, 574
  uterine, 553
    sarcoma of, 579
  wandering, 558
Myomectomy, 594, 598
  abdominal, 594
Myometrium, hypertrophy of, 486
Myxomatous degeneration, 760

N

Nausea, 953
Necrobiosis, 560
Necrosis, 560
Needle holder, 377, 477
  Sims', 377
Needles, 377, 477
Neoplasms of Fallopian tubes, 744
  of ovaries, 763, 801
  of uterus, 168, 553
  of vagina, 314, 338
  of vulva, 310, 337
Nerve trunks, 67
Nerves of uterus, 422
  of vagina, 250
Nerves, pelvic, 67
Nervous system, examination of, 109
    in relation to gynecology, 915
Neuralgic dysmenorrhea, 847
Neurasthenia, 855
Neurologic examination, 109
Neuromata of vulva, 357
Neuropathic dysmenorrhea, 849
Neuroses, 144
Neurotrophic dysmenorrhea, 849
New growths about external genitals, 37
Nodular salpingitis, 681
Nodule in cervix, 170
Nodule in corpus uteri, examination for, 56
Noma of vulva, 274
Non-gynecologic examination methods, 110
Nonmalignant tumors, 337, 338, 553
Nourishment per rectum, 673
Nuck, canal of, 343
Nurse, 121
Nutritive diseases of uterus, 409
Nutritive enemata, 673
Nymphae, 157, 239
Nymphomania, 237

O

Obesity, 133
  abdomen in, 133
Obstruction, intestinal, 955
  of bowels, 955
  to coitus, 866
Obstructive dysmenorrhea, 848
Occlusion of cervix, 173
  of Fallopian tubes, 678
  of vagina, 818
Office arrangements, 121
  assistant in, 121
Oidium albicans, 285
Ointment, Credé's, 222
Ointments, 214
Omentum, pseudocyst of, 139
Oophorectomy, 940
Oophoritis, 174, 652, 689
  suppurative, 652, 678
  tuberculosis, 713
Operation, 238
Operation, abdominal, 667, 921
  Alexander, Adam's, 528
  anesthesia for, 934
  asepsis in, 925 (*See* Asepsis)
  assistant in, 932
  bowels after, 390
    before, 925
  cervix, denudation in, 454
  complications of, 950
  conservative, in salpingitis, 940
    on Fallopian tubes, 940
  contraindications for, 922
  Crossen's retrodisplacement, 531
  cystocele, technic of, 393
  dilatation of cervix, 950
  Dudley's, for dysmenorrhea, 860
  Emmet's, for lacerated cervix, 451
    for lacerated pelvic floor, 386
  ether for, 932
  for anteflexion of cervix, 860
  for cancer of uterus, 624
  for displacement, classification of, 528
  for lacerated sphincter ani, 384
  for myoma, 593
  for pelvic inflammation, 660, 697
  for prolapse, 547
  for relaxation of pelvic floor, 380
  for retrodisplacement, 528
  for stasis hypertrophy, 337
  for vesicovaginal fistula, 401
  Gilliam, 530
  Gilliam-Crossen, 531
  Gilliam-Ferguson, 531
  Goldspon, 529
  in gynecologic treatment, 238
  in home, 923
  in hospital, 923
  indications for, 922
  in salpingitis, 697
  on round ligament, 528
  opiates after, 945
  pelvic floor, denudation in, 386
  plastic, 451
  Porro, 598
  preparation for, 923
  Pryor, 533
Operation,—Cont'd
  purgatives after, 946, 954
    before, 925
  rest after, 949
  Schroeder's, on cervix uteri, 458
  technic of, 380 (*See* Technic)
  vaginal, 938
  vomiting after, 945, 953
  water after, 945
    before, 925
Operator, face mask for, 932
Opiates after operation, 945
  in inflammation, 658
Organotherapy, 234, 905
Organs, pelvic, 1
Orgasms, sexual, 869
Os, pin-hole, 871
Outlet, vaginal, 362
Ovariotomy, 940
Ovarian abscess, 653, 680
  artery, 423
  cysts, 763
    multilocular, 775
  function, 888
  pregnancy, 727
  preparations, 907
  stroma, 747
  thrombosis, 656
  tumors, 747, 801
    infection, 799
Ovaries, 747
  accessory, 816
  adhesions of, 681
  anatomy of, 747
  anomalies of, 816
  blood vessels of, 423, 752
  cancer of, 801
  carcinoma of, 801
  cirrhosis of, 689
  conservative surgery of, 940
  corpus luteum, 752
  cystadenoma of, 767
  cystic degeneration of, 763
  dermoid of, 776
  development of, 815
  diseases of, 747 (*See* Diseases)
  displacement of, 688
  endometrial cysts, 779
  examination of, 63
  extract of, 760
  hemorrhage from, 741
  infection of, 652, 677, 689
  inflammation of, 652
  internal secretion of, 888
  ligaments, 751
  malformation of, 816
  malignant disease of, 801
  neoplasms of, 763, 801
  palpation of, 63
  papilloma of, 774
  physiology of, 755
  preservation of, during operation, 940
  prolapse of, 690
  removal of, 863
  resection of, 940
  rudimentary, 816
  sarcoma of, 805

Ovaries,—Cont'd
  serous cyst of, 772
  solid tumor of, 801
  supernumerary, 816
  transplantation of, 760
  tuberculosis of, 713
  tumor of, 763
  vessels of, 752
Ovaritis, 652
Oviducts, 4, 644
Ovulation, 755
Ovum, 756
Oxalic acid, 933

P

Packing, 214
  gauze, 214
  vaginal, 214
Pain, 190
  during convalescence, 957
  in coitus, 866
  in extrauterine pregnancy, 731
  in kidney, 7
  in pelvis in gynecologic diagnosis, 190 (*See* Diagnosis)
  intermenstrual, 864
  localized, 21
  reflected, 198
Painful menstruation, 846
Palliative treatment, judgment in, 656
  treatment of myoma, 589
Palpation, abdominal, 14, 150
  bimanual, 52, 112
  digital, 37, 167
  of abdomen, 14
  of Bartholin's glands, 35
  of coccyx, 91
  of Fallopian tubes, 63
  of kidneys, 182
  of lateral regions, 59
  of ovaries, 63
  of ureters, 66
  of uterus, 89, 172
  of vulvovaginal gland, 33
  rectoabdominal, 88, 113
  rectovaginoabdominal, 90, 115
  rectovesical, 115
  vaginal, 37, 167
  vaginoabdominal, 50, 112
Pancreas preparations, 909
  relation to gynecology, 896
Panhysterectomy, 594
Papillary cyst, 772
  erosion, 440
Papilloma of Fallopian tube, 744
  of ovary, 774
Paralysis from anesthesia, 934
  intestinal, 954
Parametritis, 687
Parametrium, 625
Parasites, vulvar, 278
Parasitic diseases of vulva, 278
Parathyroid glands, relation to gynecology, 893
Paroophoron, 761, 815
Parovarian cyst, 177, 807
Parovarium, 761, 815
  anatomy of, 761
  tumors of, 807
Partial hysterectomy, 943
Parturition, 365
Paste, hot, 202
Patency of tubes, determination of, 91
Pathologic changes in uterus, 428
Pathologic significance of menorrhagia, 843
Pathology of endometritis, 469, 473
  of kraurosis vulvae, 351
  of papillary cysts, 772
  of peritonitis, 652
  of pruritus vulvae, 534
  of salpingitis, 674, 711
  of tubal pregnancy, 718 (*See* Tubal pregnancy)
Pediculated myoma, 558, 559
Pediculosis of external genitals, 278
Pediculus pubis, 278
Pelvic abscess, 176, 661 (*See* Abscess)
    after-treatment in, 665
    bacteria in, 652, 699
    drainage in, 662
  affections, bowels in, 658, 925
  anatomy, 1, 360, 409, 499, 644
  bone, x-ray examination, 109
  cavity, inspection of, 921, 935
  cellulitis, 650, 687
  connective tissue, inflammation of, 650, 688
  edema, 742
  examination, 112
  exudates, 652, 678
  floor, 42, 360
    anatomy of, 360
    blood vessels of, 361
    examination of, 42
    Emmet's operation for lacerated, 386
    incision for repair of, 380, 385 (*See* Incision)
    instruments for, 377
    lacerations of, 365 (*See* Lacerations)
    operation, technic of, 380 (*See* Technic)
    operations, denudations in, 386
    relaxation of, 365
    repair, incision for, 380, 385 (*See* Incision)
    repair of, 380 (*See* Repair)
    suturing of, 384
    tears of, 365
  gynecologic examination, 12
  hematocele, 723, 738
  hematoma, 176
  hemorrhage, 741
  inflammation, 644
    acute 651 (*See* Acute pelvic inflammation)
    chronic, 676 (*See* Chronic pelvic inflammation)
    prophylaxis of, 652
  mass in gynecologic diagnosis, 173, 190 (*See* Diagnosis)
  massage, 224
  nerves, 67
  organs, 1
  pack, 203
  pain in, 190
  pericervical tissues, examination of, 50

Pelvic,—Cont'd.
  peritoneum, 649
  peritonitis, 666
  pneumoperitoneum, 98
  suppuration, 678
  tuberculosis, 713
  tumor, 556, 600
    knee-chest posture in, 416
Pelvis, antero-posterior section of, 2
  congestion of, 843
  echinococcus disease of, 746
  pain in, in gynecologic diagnosis, 190
  pus in, 652, 678
  tenderness in, 65
  tuberculosis of, 713
Percussion of abdomen, 27
  deep, 29
  superficial, 29
Perforating ulcer, 317
Perineal incision, closure of, 389
Perineorrhaphy, 378 (*See* Pelvic floor)
  after-treatment in, 555
  preparations for, 377
Perineum, 37, 363, 815
  lacerations of, (*See* Lacerations)
  suturing of, 389
Perirectal disease, 197
Peritoneal cavity in relation to gynecology, 911
  invasion of, 921
Perirenal tumor, 157
Peritoneal drainage, 668, 672
Peritoneum, 426
  anatomy of, 426
  diseases of, 187
  infection of, 666
  inflammation of, 668
  laceration of, 365
  pelvic, 649
  pseudotuberculosis of, 746
  repair of, 378
  toilet of, 936
  tuberculosis of, 714
Peritonitis, 666, 797
  acute diffuse, 653
  causes of, 652
  diagnosis of, 656
  drainage in, 668, 672
  general, 666
  pathology of, 652
  pelvic, 666
  postoperative, 955
  symptoms of, 655
  treatment of, 668
  tuberculous, 714
Periurethral abscess, 318
Pessaries, 218, 511
  action of, 512
  care of, 518
  cup and belt, 547
  flexible ring, 522
  for prolapse, 541
  for retrodisplacement, 511
  Gehrung, 543
  hard rubber disk, 542
  Hewitt, 546
  Hodge, 511
  in gynecologic treatment, 511
Pessaries,—Cont'd.
  inflated ring, 512, 521
  instruction to patient using, 518
  introduction of, 516
  Menge, 543
  selection of, 513
  Smith, 511
  stem, 859
  Thomas, 512
  varieties of, 511
Phagedenic chancroid, 292
Phlebitis, 956
Phlegmonous vulvitis, 273
Physical change in menopause, 420
    in menstruation, 416
  examination, 11
Physiologic significance of menstruation, 830
Pineal gland, relation to gynecology, 895
Pin-hole os, 871
Pitcher douche, 959
Pituitary gland preparations, 909
  relation to gynecology, 894
Placenta and internal secretion, 896
Placental remnants, 119
Plaster, adhesive, 947
Plastic operation, 451
Pneumoperitoneum, needle and uterine cannula for, 94
  pelvic, for diagnosis, 98
Points, special, in abdominal section, 936 (*See* Abdominal section)
Polypus, metrorrhagia from, 463
Polypi, 171, 463
  cervical, 436, 463
    hemorrhage in, 463
  of cervix uteri, 436, 463
Polypoid endometritis, 474
Porro operation, 598
Position of arms during anesthesia, 934
  of examiner, 17
  of uterus, 499
Posterior displacements, 501
Postoperative adhesions, 954
  enemata, 954
  hemorrhage, 952
  insanity, 712
  vomiting, 945, 953
  tympanites, 953
Posture, dorsal, 311
  erect, 2, 3
  Fowler, 672
  gynecologic, 229
  horizontal, 13
  knee-chest, 72, 229
    description of, 229
    in examination, 72
    in gynecologic treatment, 229
    in pelvic tumor, 231
    in prolapse, 231
    in puerperium, 231
    in retrodisplacement, 510, 519
    indications for, 230
  left lateral, 81
  semi-prone, 81
  Sims, 81
  Trendelenburg, 71, 231
Powders, in treatment, 213

Precocious menstruation, 865
  puberty, relation to internal secretion, 899
Pregnancy, 140, 837
  abdomen in, 140, 728
  abdominal, 728
  ampullar, 720
  auscultation in, 29
  carcinoma complicating, 614, 632
  diagnosis of, 112; serum test, 112
  extrauterine, 718 (*See* Extrauterine pregnancy)
  in uterine horn, 177
  interstitial, 720, 727
  isthmic, 720
  myoma and, 585, 597
  ovarian, 727
  tubal, 161, 718
    hemorrhage in, 724
    pathology of, 718 (*See* Tubal pregnancy)
  wandering, 727
Preoperative enemata, 925
Preparations for abdominal section, 923 (*See* Abdominal section)
  for anesthesia, 923
  for curettage, 477
  for examination, 120
  for operation, 923
  for perineorrhaphy, 377
  for repair of cervix, 451
  for repair of pelvic floor, 377
  for trachelorrhaphy, 451
  for vaginal section, 940
  of operator, 932
Prepuce, adherent, 163, 358
Preservation of specimens, 126
Pressure treatment, 227
    of retrodisplacement, 525
Proctoclysis, 672
Proctoscopic examination, 109
Prognosis of kraurosis vulvae, 353
  of salpingitis, 674, 711
Prolapse, knee-chest posture in, 231
  of bladder, 163, 372, 393, 549
  of ovary, 690
  of urethral mucosa, 166, 320
  of uterus, 166, 535
    causes, 535
    diagnosis, 540
    pathology, 535
    radical treatment, 547
    symptoms, 538
    treatment, 541
  of vagina, 163
  operation for, 547
  pessaries for, 541
  vaginal, 163, 370, 392
Proliferating cysts, 767, 807
Prominence of abdomen, 133
Prophylaxis of endometritis, 469
  of pelvic inflammation, 652
  of retrodisplacement, 501
  of shock, 937
  of subinvolution, 485
Prurigo of vulva, 278
Pruritus vulvae, 161, 354
    causes of, 354
    diagnosis of, 355
Puritus vulvae,—Cont'd.
    pathology of, 354
    symptoms of, 355
    treatment of, 355
    x-ray in, 356
Pryor operation, 533
Pseudocyst of lesser omentum, 139
Pseudohermaphroditism, 823
Pseudomucinous cysts, 767
Pseudotuberculosis of peritoneum, 746
Psychotherapy, 235
Puberty, 828
  delayed, 898
  precocious, 899
  relation of, to menstruation, 828
Pubic louse, 278
Pudendal hematoma, 346
  hernia, 342
  hydrocele, 345
  tumor, 310, 337
Puerperal abscess, bacteria in, 699
  infection, 469, 652
Puerperium, knee-chest posture in, 231
Purgatives after operation, 946, 954
  before operation, 925
  in inflammation, 658, 695
Purulent discharge, 33
Pus in pelvis, 652, 678
  microscopic examination of, 33, 255
Putting on rubber gloves, 125
Pyemia, bacteria in, 699
Pyonephrosis, 185
Pyosalpinx, 184, 652, 678, 790
  bacteria in, 699

R

Radical treatment for cancer of uterus, 623
  for fibroid of uterus, 591
  for prolapse of uterus, 541
  for salpingitis, 697
Radium in treatment of carcinoma, 235, 627
  of myoma, 235, 591
Rape, 961
  of children, 963
Reasons for conservative surgery, 940
Records, 9
  diagrams in, 9
  gynecologic, 9
  of examination, 9
Rectal digital examination, 113
  examination, 113
Recti muscles, 136
  separation of, 136
Rectoabdominal examination, 88
Rectoabdominal palpation, 88, 113
Rectocele, 163, 370, 392
Rectoperineal fistula, 395
Rectovaginal fistula, 395
Rectovaginoabdominal examination, 90, 115
Rectovesical palpation, 115
Rectum, 45
  carcinoma of, 610
  examination of, 45
  in relation to gynecology, 912
Red degeneration of myoma, 563
Reflex pains, 198
Regeneration of endometrium, 481

Regions of abdomen, 15
Regular steps in abdominal section, 934 (*See* Abdominal section)
Relaxation of pelvic floor, 360 (*See* Laceration)
Relaxed abdominal wall, 136 (*See* Abdominal wall)
  vaginal outlet, 42
Remnants, decidual, 119
  placental, 119
Removal of ovary, 863, 940
  of sutures, 948
Renal tumor, 183
Repair of cervix, 451
    after-treatment for, 456
    denudation for, 454
    incisions for, 451
    indications for, 451
    instruments for, 453
    preparations for, 451
    steps in, 451
    sutures in, 454
  of pelvic floor, 380
    after-treatment for, 389
    denudation for, 386
    incisions for, 380, 386
    indications for, 375
    instruments for, 377
    preparations for, 377
    steps in, 380
      Emmet's operation, 386
    sutures in, 384
Replacement, bimanual, 510
  methods of, 510
  of uterus, 510
  pessary after, 515
Resection of vaginal outlet, 386
  of ovaries, 940
Respiratory system in relation to gynecology, 912
Rest, 200
  after operation, 949
  in gynecologic treatment, 200
  in inflammation, 200
  sexual, 201
Retarded menstruation, 865
Retention of blood, 163
  of urine, 408
Retractors, vaginal, 377
Retrodisplacement, 54, 501
  adherent, 509
  cases, classification of, 528
  causes of, 501
  definition of, 501
  diagnosis of, 505
  knee-chest posture in, 510, 519
  movable, 510
  of uterus, 501
  operation for, 528
  pessaries for, 511
  prophylaxis of, 501
  replacement of, 509
  retroflexion, 501
  retroversion, 501
  symptoms of, 504
  treatment of, 509
  with acute inflammation, 523
  with chronic inflammation, 525
Retroflexion, 501
Retroperitoneal myoma, 558
  tumor, 157
Retroposition of uterus, 172
Retroversio-flexion, 501
Retroversion, 501
Retroverted pregnant uterus, 791
Retroverted uterus, 172
Rodent ulcer, 317
Rotation of cyst, 798
Round ligament, 426
  anatomy of, 426
  myoma of, 184
  operations on, 528
  transplantation of, 530
  tumor of, 184
Routine use of rubber gloves, 125
Rubber dam, 950
  drains, 663, 950
  gloves, 125
    in abdominal section, 932 (*See* Abdominal section)
    in examination, 38, 125
    putting on, 125
    routine use of, 125
    sterilization of, 126
  tube drainage, 663, 952
Rudimentary Fallopian tubes, 719
  hymen, 968
  ovaries, 816
  uterus, 820
  vagina, 818
Rupture of bladder, 140
  of Fallopian tubes, 723

S

Sacral backache, 196
Sacrouterine ligaments, 426
Saline solution, 672
Salpingitis, 174, 190, 652, 677, 863
  acute, 652
  bacteria in, 652
  causes of, 652, 677
  chronic, 677
  conservative operation in, 940
  diagnosis of, 656, 690
  gonorrheal, 700, 704
  mild, 652, 678
  nodular, 681
  operation in, 697
  pathology of, 652, 711
  prognosis of, 674, 711
  radical treatment for, 697
  suppurative, 653, 790
  symptoms of, 655, 682
  treatment of, 658, 694
  tuberculous, 713
Sarcoma of ovary, 805
  of uterine myoma, 579
  of uterus, 639
  of vagina, 315
  of vulva, 310
Scabies, 279
Scanty menstruation, 843
Scars of vaginal wall, 44
Schroeder's operation on cervix uteri, 458
Scopolamin in anesthesia, 740
Sedatives, 233

Semi-prone posture, 81
Senile bleeding, 830
  endometrium, 420
  ovary, 759
  vaginitis, 287
Sense organs in relation to gynecology, 915
Separation of recti muscles, 136 (*See* Abdominal wall)
Septate uterus, 820
  gestation in, 822
  vagina, 819
Septic endometritis, 469
  thrombophlebitis, 674
  thrombosis, 655
Serous cystadenomata, 772
Serum test: pregnancy, 112; gonorrhea, 111
Serum therapy, 266
Sexual disturbances, 869
  impotence, 869
  orgasm, 869
  rest, 201
Shape of abdomen, 13, 133
  of abdomen in ascites, 138
Shock, 937
  causes of, 937
  from extrauterine pregnancy, 733
  from hemorrhage, 733
  prophylaxis of, 937
  symptoms of, 733
  treatment of, 952
Significance of leucorrhea, 157
  of menorrhagia, 843
  of menstruation, 830
Signs of ascites, 138
  of extrauterine pregnancy, 735
Silkworm-gut, 384
Simple endometritis, 469, 476
  ulcer, 289
  vaginitis, 279
  vulvitis, 161, 268
Sims' needle-holder, 377
  posture, 81
  speculum, 80, 81
Sinus, 957
  of vulvovaginal gland, 325
Sitz-bath, 203
Skene's glands, 244
  infection of, 263
  of urethra, 244
Skin in relation to gynecology, 914
Smith pessary, 511
Soap, 124
  in examination, 124
  liquid, 124
Soft chancre, 291
Solid tumor of ovary, 801
  of vulva, 310, 337
  of uterus, 556
Solutions in treatment, 210
  saline, 672
Sound, instrumental examination by, 84
  uterine, 84
Special points in abdominal section, 936 (*See* Abdominal section)
Specimen scissors, 75
Specimens, fixing, 126
  from examination, 126
  preservation of, 126
Speculum, 73
  bivalve, 73
  cylindrical, 80
  Edebohl's 477
  examination by, 73, 189
  Graves', 73
  information obtained through, 77
  introducing, 75
  Sims', 80
  vaginal, 73
Sphincter ani, 372
  laceration of, 44, 372
  suturing of, 384
Spirochete pallida, 297
Spleen, diseases of, 151
  enlarged, percussion of abdomen in, 140
Split-tube drainage, 952
Sponge forceps, 377
Sponges, 926
  abdominal, 926 (*See* Abdominal section)
  Crossen's gauze-strip, 926
  detached, 926
Standing posture, examination in, 46
Stasis hypertrophy, 164, 332
  of vulva, 332
  operation for, 337
Stem pessary, 859
Stenosis of vagina, 818
Sterility, 869
  causes of, 870
  diagnosis, 872
  relation to internal secretion, 902
  treatment of, 873
Sterilization of abdomen, 925
  of abdominal dressing, 936
  of abdominal surface, 925 (*See* Abdominal section)
  of catheters, 960
  of hand brushes, 125
  of hands, 125, 933
  of instruments, 123
  of rubber gloves, 38
  of sutures, 925
  of vulva, 376
Sterilizer, instrument, 122
Stimulants, 952
Stomach, acute dilatation of, 953
  in relation to gynecology, 911
Streptococcic infection of pelvic cellular tissue, 705
Structure of labia, 239
Stupes, turpentine, 202
Subcutaneous hemorrhage, 346
  injections, 952
Subinvolution of uterus, 481
  prophylaxis of, 485
Submucous myoma, 559
Subperitoneal myoma, 557
  hematoma, 725
Suburethral abscess, 319
Supernumerary ovary, 816
Supporter, abdominal, 949 (*See* Abdominal section)
  uterine, 541
Supports of uterus, 500
Suppositories, vaginal, 214
Suppression of menses, 843

Suppuration of abdominal wound, 955
    diagnosis of, 955
    symptoms of, 955
    treatment of, 956
  of myoma, 560
  pelvic, 678
Suppurative oophoritis, 653
Salpingitis, 653
Suprapubic incision, 921, 935
Supravaginal amputation, 594
  hysterectomy, 594
Surface, abdominal, sterilization of, 925
    (*See* Abdominal section)
Suspension, ventral, 529
Sutures, buried, 384
  catgut, 384
  continuous, 384
  crown, 384
  in abdominal wound, 932, 948
  in cervix, 454
  in perineum, 388
  in repair of cervix, 454
  in repair of pelvic floor, 384, 387
  removal of, 948
  sterilization of, 925
Suturing of levator ani, 388
  of pelvic floor, 384, 387
  of sphincter ani, 387
  of uterus forward, 527
  of vulva, 337
Swelling of external genitals, 36, 163
  of vulva, 164
Symptoms of amenorrhea, 831
  of endometritis, 470, 475
  of extrauterine pregnancy, 729
  of gonorrhea, 253
  of imperforate hymen, 818, 833
  of kraurosis vulvae, 351
  of menopause, 830
  of menorrhagia, 843
  of metrorrhagia, 843
  of myoma, 574
  of ovarian cysts, 787
  of pelvic inflammation, 655
  of peritonitis, 655
  of pruritus vulvae, 355
  of retrodisplacement, 504
  of salpingitis, 655, 682
  of shock, 733
  of suppuration of abdominal wound, 955
  of tubal pregnancy, 929
  of vulvitis, 269
Syphilis, 297; Wassermann reaction, 110
  of external genitals, 297
  of uterus, 494
Syphilitic ulcer, 162

T

Table, examining, 131
Tablets, in treatment, 214
Taking history, 1
Tampon-capsules, 217
Tampons, 214, 547
  for hemorrhage, 217
  gauze, 216
  vaginal, 216
T-bandage, 959
Technic of cervix operations, 451
    regular amputation, 462
  of curetment, 477
  of cystocele operation, 393
  of excision of vulva, 331
  of pelvic floor operation, 380
    Emmet's, 386
Tenaculum forceps, 477
  Crossen's puncturing, 535
Tenderness in abdomen, 14, 21, 145
  in pelvis, 65
  intestinal, 145
  localized, 21
  of kidney, 22
  of vagina, 167
  urethral, 41
  vesical, 41
Tension of abdomen, 14, 144
Testing function of kidney, 924
Theilhaber operation, 860
Therapeutic curetment, 476
Therapy, gynecologic, 199
  relation to internal secretion, 903
Thomas pessary, 512
Thrombophlebitis, 674
Thrombosis, broad ligament, 656
  iliac, 656, 956
  ovarian, 656
  septic, 655
  uterine, 656
Thymus, relation to gynecology, 895
Thyroid gland preparations, 908
  relation to gynecology, 892
Time for menopause, 830
  for menstruation, 829
Tissue forceps, 377
Tonics, 234
Torsion of adnexa, 745
Total hysterectomy, 594
Trachelorrhaphy, 451
  after-treatment in, 456
  preparations for, 451
Transplantation of ovary, 760
Transplantation of round ligament, 530
Transverse perineal muscles, 361
Traumatism of vulva, 348
Treatment, constitutional, 841
  bacterial, 234
  diet in, 235
  exercise, 231
  for hemorrhage, 738
  for menopause, 830
  foreign protein, 234
  friction rubbing, 227
  gynecologic, 199
    bathing in, 227
    cauterization, 218
    cervical dilatation, 223
    cold in, 204
    counterirritation in, 205
    curettage, 223
    diet, 235
    dress in, 228
    dry heat in, 203
    intrauterine, 218
      applications, 208, 218
      cauterization, 218
      curettage, 223

- Treatment, gynecologic, intrauterine, —Cont'd
    - dilatation, 223
    - irrigation, 223
    - vacuum, 224
  - knee chest posture in, 229, 510, 519
  - local, 208
  - massage in, 224, 228
  - methods in, 199
  - moist heat in, 202
  - ointments, 214
  - operations in, 238
  - pessaries in, 218, 859
  - powders in, 213
  - pressure treatment in, 227
  - psychotherapy, 235
  - radium, 235
  - rest in, 200
  - solutions in, 210
  - suppositories, 214
  - tablets, 214
  - tampon capsules, 217
  - tampons, 214
  - Trendelenburg posture, 231
  - vacuum, 224
  - vaginal applications in, 206, 208
  - vaginal douches in, 206
  - x-ray, 236
- internal, 233
- methods of, 199
- of amenorrhea, 834, 841
- of bloody discharge, 880
- of carcinoma, 623, 633
- of chancroid, 294
- of chronic gonorrhea, 263
- of cystocele, 393
- of dysmenorrhea, 856, 864
- of endometritis, 471, 476
- of eversion of cervical mucosa, 449
- of extrauterine pregnancy, 738
- of gonorrhea, 258, 263
- of hyperesthesia of vaginal entrance, 357
- of imperforate hymen, 818
- of kraurosis vulvae, 353
- of leucorrhea, 878
- of menorrhagia, 844
- of menstruation, 830
- of myoma, 589
- of ovarian cysts, 800
- of parovarian tumors, 811
- of pelvic floor relaxation, 374
- of pelvic inflammation, 658, 694
- of peritonitis, 668
- of pruritus vulvae, 355
- of rectovaginal fistula, 395
- of retrodisplacement, 509
- of salpingitis, 658, 694
- of sarcoma, 633
- of shock, 952
- of sterility, 873
- of suppuration of abdominal wound, 955
- of syphilis, 303
- of tubal pregnancy, 738 (*See* Tubal pregnancy)
- of ulcers, 290
- of urethral caruncle, 322
- of vesicovaginal fistula, 401
- of vulvitis, 269

- Treatment,—Cont'd
  - organotherapy, 234, 905
  - palliative, of fibromyoma, 589
  - radium, 591
  - vaccine, 266
  - vaginal, 206
  - x-ray in, 236, 306, 318, 356, 592, 628
- Trendelenburg posture, 231
- Trials, criminal, 971
- Trichomonas vaginitis, 282
- Trophic function of ovary, 757
- Trunks, nerve, 67
- Tubal abortion, 726
  - abscess, 652, 680
  - gestation, 718
  - pregnancy, 718
    - causes of, 718
    - diagnosis of, 729
    - hemorrhage in, 724
    - metrorrhagia from, 730
    - pathology of, 718
      - carried to term, 728
      - free intraperitoneal hemorrhage, 725
      - hematocele, 723
      - hematoma, 725
      - mass from repeated hemorrhage, 724
      - rupture into broad ligament, 726
      - tubal abortion, 726
    - symptoms of, 729
    - treatment of, 738
      - advance cases, 741
      - before rupture, 738
      - moderate hemorrhage, 738
      - pelvic hematocele, 739
      - pelvic hematoma, 741
      - profuse hemorrhage, 739
    - tuberculosis, 715
    - varieties of, 722
- Tuberculin test, 110
- Tuberculosis, of endometrium, 476
  - of Fallopian tubes, 715
  - of ovaries, 713
  - of pelvis, 713
  - of peritoneum, 714
  - of uterus, 491
  - of vagina, 306
  - of vulva, 304
  - of vulvovaginal gland, 328
  - tuberculin test, 110
  - x-ray in, 306
- Tuberculous adhesions, 714, 717
  - endometritis, 476
  - peritonitis, 714
  - salpingitis, 715
  - vaginitis, 306
- Tubes, blood vessels of, 648
  - Fallopian, 644
  - glass drainage, 950
  - patency of, 91
- Tuboovarian cysts, 766
  - mass shown in x-ray, 106
  - pregnancy, 720
  - region, palpating, 61
- Tumor, abdomen in, 142
  - of abdomen, 142
  - of abdominal wall, 133 (*See* Abdominal wall)
  - of broad ligament, 184, 807

Tumor,—Cont'd
  of external genitals, 310, 337
  of Fallopian tube, 744
  of kidney, 183
  of ovary, 747
  of parovarium, 807
  of round ligament, 184
  of uterus, 556, 600
  of vagina, 314, 337
  of vulva, 310, 337
  ovarian, 747
    infection of, 799
  pelvic, 556, 600
    knee-chest posture in, 231
  perirenal, 157
  pudendal, 337
  renal, 183
  retroperitoneal, 157
  solid, of ovary, 801
    of uterus, 556
    of vulva, 310, 337
  uterine, 556, 600
  vesical, 188
Turpentine stupes, 202
Two fingers in examination, 69
Tympanites, 137
  abdomen in, 137
  ovarian cyst differentiated, 792
  in examination, 137
  postoperative, 953
Tympany, intestinal, 137

U

Ulcers, 36, 162, 289
  of cervix uteri, 159, 441, 618
  of external genitals, 36, 162, 289
  of vagina, 158, 289
  of vulva, 157, 289
  rodent, 317
  simple, 289
Ulcus rodens, 304, 317
    vulvae, 163
    x-ray in, 318
Umbilical hernia, 135
Unicornuate uterus, 820
Ureter calculi of, 176
  diseases of, 176
  examination of, 66
  injuries of, 937
  palpation of, 66
Ureteritis, 146
Ureterouterine fistulae, 407
Ureterovaginal fistula, 399
Urethra, 242
  anatomy of, 242
  anomalies of, 815
  carcinoma of, 313
  caruncle of, 321
  destruction of, 408
  diseases of, 251 (*See* Diseases)
  diverticulum of, 318
  examination of, 41
  infection of, 318
  inflammation of, 318
  malformation of, 815
  Skene's glands of, 244
Urethral abscess, 318
  caruncle, 165, 321
Urethral,—Cont'd
  discharge, 33, 41
  diseases, 34
  mucosa, prolapse of, 166, 320
  tenderness, 41
Urethritis, 34, 251, 318
  acute, 34, 251, 318
  chronic, 318
  gonorrheal, 255
Urinary fistulae, 399
  system in relation to gynecology, 913
Urine, incontinence of, 408
  retention of, 408
Uteri, corpus, 430
Uterine atrophy, relation to internal secretions, 898
  curet, 87, 479
  digital examination, 119
  dilators, 85, 477
  diseases, (*See* Diseases of uterus)
  dressing forceps, 74
  exploration under anesthesia, 115
  fibroids, atrophy of, 556
    sarcoma of, 579
  forceps, 477
  gas insufflation, position of patient for, 95
  hemorrhage, 160
  horn, gestation in, 177
    pregnancy in, 177
  sound, 84
  supporter, 949
  suppositories, 222
  tenaculum forceps, 75
  thrombosis, 656
  tumors, 556, 600
Uterus, absence of, 834
  adhesions of, 523
  anatomy of, 409, 499
  anomalies of, 815
  atresia of, 173
  atrophy of, 834, 853, 898
  backward displacement, 501
  bacteria in, 469
  bicornuate, 820
  bimanual examination of, 52
  blood vessels of, 414, 422
  cancer of, 191, 600
    radical treatment for, 623
  carcinoma of, 600
  cirrhosis of, 839
  classification of diseases of, 430
  development of, 815
  diseases of, 430 (*See* Diseases)
  displacement of, 172, 499
  double, 820
  drawing down in examination, 170
  echinococcus disease of, 496
  endocervicitis, 432
  enlarged, percussion of abdomen in, 150
  enlargement, 172
  examination of, 52
  fetal, 412
  fibroid and pregnancy, 597
  fibroid of, radical treatment for, 591
  fibromyoma of, 556 (*See* Fibromyoma)
  fixation of, 523, 624
  flexion of, 504
  foreign bodies in, 859

Uterus,—Cont'd
  forward, suturing of, 527
  gonorrhea of, 469
  hyperinvolution of, 490, 839
  infantile, 410, 897
  infection of, 469
  inflammation of, 469
  injuries of, 443
  inversion of, 541, 552
  ligaments, 426
  lipoma of, 599
  localization of diseases of, 430
  lymphatics of, 414
  malformation of, 820 (*See* Malformation)
  malignant disease of, 600 (*See* Malignant disease)
  malposition of, 172
  myoma of, 553
  neoplasms of, 168, 553
  nerves of, 422
  non-malignant tumors of, 553
  operation for cancer of, 624
  palpation of, 52, 172
  pathologic changes, 428
  position of, 499
  pregnancy and fibroid, 597
  prolapse of, 166, 535 (*See* Prolapse of uterus)
    radical treatment for, 547
  replacement of, 509
  retrodisplacement of, 55, 501
  retroposition of, 172
  retroverted, 172
  rudimentary, 820, 897
  sarcoma of, 639
  septate, 120, 820
    gestation in, 822
  solid tumor of, 556
  subinvolution of, 481
  supports of, 500
  syphilis of, 494
  tuberculosis of, 491 (*See* Tuberculosis)
  tumor of, 166, 541, 556, 600
  unicornuate, 820

V

Vaccine treatment, 266, 673
Vacuum treatment, 224
Vagina, 1
  absence of, 163, 815, 818
  anatomy of, 239, 247
  anomalies of, 163, 818
  aphthae of, 295
  atresia of, 163, 815, 818
  bacteria in, 255, 279
  blood vessels, 250
  carcinoma of, 314
  chancroid, 291
  congenital atresia of, 163
  cysts, 340, 540
  development of, 815
  digital examination, 37
  diseases of, 167, 239 (*See* Diseases)
  disinfection of, 376, 477
  double, 163, 819
  epithelioma of, 314
  epithelium of, 250
  examination of, 37

Vagina,—Cont'd
  hyperesthesia of vaginal entrance, 357
  infection of, 255, 279
  irrigation of, 206
  lymphatics of, 250
  malignant disease of, 314
  malformation of, 163
  neoplasms of, 314, 338
  nerves, 250
  occlusion of, 818
  prolapse of, 163, 370, 372
  rudimentary, 819
  sarcoma of, 315
  size, 247
  stenosis of, 818
  syphilis, 297
  tuberculosis of, 306
  tumors of, 314, 337
  ulcers of, 158, 289
  vessels, 250
Vaginal antisepsis, 478
  applications, 206 (*See* Applications)
  cyst, 177, 340
  diagnosis, 177
  digital examination, 37, 167
  diseases, 239
  douche, hot, 206
    in gynecologic treatment, 206
  drainage, 662
  examination, 37, 167 (*See* Examination)
    asepsis in, 122
  fixation, 532
  forceps, 477
  hernia, 169, 340
  hysterectomy, 594
  injections, 206
  operation, 938
    after-treatment, 958
  orifice, dilatation of, 357
  outlet, 362
    relaxed, 42
  packing, 214, 526
  palpation, 37, 167
  prolapse, 163, 370, 392
  section, 667, 938
    advantages, 938
    after-treatment in, 958
    anterior, 938
    disadvantages, 939
    preparations for, 940
    selection of cases, 939
    steps, 940
  speculum, 73
  suppositories and cones, 214
  tampons, 214, 511
  treatment, 206
  walls, 40, 77
    adhesions of, 158, 286, 818
    inspection of, 167
    protusion of anterior and posterior, 44
Vaginismus, 357
Vaginitis, acute, 158, 279, 286
  adhesive, 158, 286
  aphthous, 285
  bacteria in, 268, 280
  catarrhal, 279
  causes of, 251, 279
  chronic, 263, 281

Vaginitis,—Cont'd
  diagnosis of, 254, 281, 288
  diphtheritic, 286
  emphysematous, 286
  exfoliative, 289
  gonorrheal, 251
  in children, 281
  mycotic, 285
  parasitic, 285
  senile, 287
  simple, 279
  trichomonas, 282
  tuberculous, 306
  varieties of, 251
Vaginoabdominal examination, 50, 172 (*See* Examination)
  hysterectomy, 594
  palpation, 112
Vaginolabial hernia, 343
Vaginorectal fistula, 395
Varicose veins, 348
  of broad ligament, 745
  of external genitals, 348
  of vulva, 348
Varix of vulva, 348
Vascular murmur, 29
Veins, calculi of, 745
  infection of, 655
  varicose, 348, 745
Venereal diseases, 151, 291, 297, 328
Ventral fixation, 529
  hernia, 135
  suspension, 529
Vermiform appendix, 182
Verruca, 328
Vesical induration, 188
  tenderness, 41
  tumor, 188
Vesicles, herpetic, 277
Vesicofixation, 532
Vesicouterine ligament, 426
Vesicovaginal fistulae, 399
Vessels of ovary, 423
  of vagina, 250
Vestibule, 815
Vicarious menstruation, 865
Violence in coitus, 248
Virgin, amenorrhea in the, 832
  dysmenorrhea in the, 849
  rectoabdominal examination, 89
Virulence in pelvic inflammation, 699
Virus, chancroidal, 291
Vomiting, 953
  after operation, 953
Vulva, 157, 239
  anatomy of, 157, 239
  atresia of, 163
  blood supply of, 247
    vessels of, 247
  carcinoma of, 163, 310
  chancroid of, 291
  condylomata of, 164, 328
  contusion of, 348
  cysts, 339
  diphtheria, 274
  diseases of, 239 (*See* Diseases)
  disinfection of, 376
  eczema of, 274
Vulva,—Cont'd
  elephantiasis, 164, 334
  epithelioma of, 310
  epithelium of, 243
  erysipelas of, 272
  examination of, 31
  excision of, 331
  extirpation of, 331
  follicular vulvitis, 271
  gangrene of, 274
  hematoma, 346
  herpes of, 277
  infection of, 157, 251, 268
  inflammation of, 157, 251, 268
  injuries of, 348
  inspection of, 31, 157
  intertrigo, 276
  kaurosis of, 350
  x-ray in, 356
  lacerations of, 163 (*See* Lacerations)
  lipoma of, 334, 337
  lupus of, 304
  lymphatics, 247
  malformations of, 163
  malignant disease of, 310
  neoplasms of, 310, 334
  neuromata of, 357
  noma of, 274
  parasitic diseases of, 278
  phlegmon of, 273
  prurigo of, 278
  pruritus of, 354
    x-ray in, 356
  rudimentary, 820
  sarcoma of, 310
  simple vulvitis, 268
  solid tumor of, 310, 337
  stasis hypertrophy of, 332
  sterilization of, 542
  suturing of, 337
  swelling of, 36, 163
  syphilis of, 297
  technic of excision of, 331
  traumatism of, 348
  tuberculosis of, 304
  tumor of, 310, 337
  ulcer of, 157, 289
  ulcus rodens of, 317
  varicose veins of, 348
  varix of, 348
  wounds of, 348
Vulvar applications, 206, 211
  cellulitis, 273
  dermatitis, 268
  diagnosis, 157 (*See* Diagnosis)
  diseases, 239 (*See* Diseases)
    classification of, 251
  dressings, 959
  eczema, 274
  enterocele, 343
  hernia, 342
  hematoma, 346
  hemorrhage, 346
  parasites, 278
Vulvitis, 268
  acute, 268
  causes of, 268, 273
  chronic, 268, 271

Vulvitis,—Cont'd
  diagnosis of, 269
  diphtheritic, 274
  erysipelas, 272
  follicular, 161, 263, 271
  gangrenous, 274
  gonorrheal, 161, 251
  intertrigo, 276
  simple, 161, 268
  symptoms of, 269
  treatment of, 269
  varieties of, 251
Vulvovaginal abscess, 322
  cyst, 326
  gland, 33, 244
    abscess of, 322
    anatomy of, 34, 244
    carcinoma of, 327
    cysts of, 326
    discharge from, 33
    duct, 33
    examination of, 42
    gonorrhea of, 263
    infection of, 33, 322
    inflammation of, 322
    palpation of, 33
    sinus of, 325

W

Wall, abdominal, 12, 133 (*See* Abdominal wall)
    movement of, 143
    tumor of, 133
  vaginal, 40
Wandering myoma, 558
  kidney, 182
  pregnancy, 727
Warm applications, 202
Warts, 328
  excision of, 331
Wassermann reaction, 110
Water, after operation, 945
  bag, hot, 203
  before operation, 925
Watery discharge, 36
Wave in ascites, 26
Wolffian body, 761, 812
  duct, 812
Wound, abdominal, 947 (*See* Abdominal wound)
    infection of, 955
    suppuration of, 955
    sutures in, 932, 948
  cervical, infection of, 456
  of vulva, 348

X

X-ray examinations, 91, 97
X-ray in cancer, 236, 628
  in diagnosis of pregnancy, 97
  in gynecology, 236
  in kraurosis vulvae, 356
  in lupus vulvae, 306
  in myoma, 592
  in pruritus vulvae, 356
  in tuberculosis, 306
  in ulcus rodens, 318

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